WESTERN STATES EDITION

DOMESTIC ENGINEERING

Whole No. 747. Chicago and New York, Saturday, April 6, 1907. Vol. XXXIX No. 1 $1.00 a Year

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NEW KNICKERBOCKER HOTEL, NEW YORK CITY, N. Y. Trowbridge & Livingston, Architects. Warmed by 26,000 square feet of AMERICAN Radiation, mostly Peerless and Rococo plain patterns. Heating Contractors, Messrs G. A. Suter & Co., New York City.

AMERICAN RADIATOR COMPANY

General Offices, 282-284 Michigan Avenue, Chicago.

See Page 27 for Addresses of Sales Branches.

We Have Commenced Suit

Against infringers of our patent supplies

$1,000 Reward

Will be given to any plumber who can prove and convict any one fraudulently using our name on supplies.

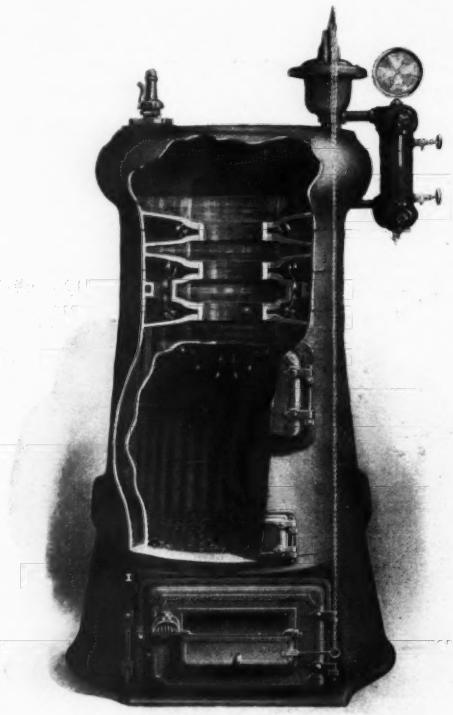
Cleveland **GLAUBER BRASS MFG. CO.** Ohio

RELIABLE CONNECTIONS made between Lea and Iron Pipe by using the Raymond Ferrule—the only Lead Ferrule on the market which has an **extra thickness of lead over the shoulder,** giving strength where it is needed and where other lead ferrules are weak. The genuine article bears our label

RAYMOND LEAD CO.

Crosby Spring Seat Globe and Angle **Valves** All Parts Interchangeable. All Parts Removable. Tested for Highest Pressures. **Leak-Proof** CROSBY STEAM GAGE & VALVE CO. Boston New York Chicago

TD1*
D66
V.39



HOLLAND STEAM BOILERS

Generate Steam Quickly
Maintain it Steadily

With An

Unvacillating Water Line

Note Particularly the

Air Space in Grate—Fuel Capacity
Combustion Chamber—Large Centre
Connection—Access for Cleaning

Send for Descriptive Catalog

Holland Radiator Company
38 Dearborn Street, Chicago.
PLANT AT BREMEN, INDIANA

MALLEABLE IRON VISES, HARDENED STEEL JAWS—Fully Guaranteed

E. HENDERER & CO., - - - WILMINGTON, DEL.

Write for a brand new copy of "GRAPHITE as a LUBRICANT," Tenth Edition. All the newest, freshest and best information on the modern practice of graphite lubrication. Get FREE COPY 37-C. : : : : : : :
JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

HOMESTEAD VALVES **For Difficult Service**
Homestead Valve Mfg. Co., Pittsburg, Pa.

REGULATORS
STEAM
WATER

ROSS VALVE CO.
TROY, N. Y.

INDEX TO ADVERTISEMENTS ON PAGE XXX

An Interesting Booklet About Unions

An expensive union is often used where a cheap cast iron union would make an equally satisfactory joint, and cheap unions are installed where non-corrosive joints are necessary. Our new booklet is intended to prevent such mistakes. It describes and illustrates 22 different unions—the most complete line in the world.

SEND FOR IT

BOSTON
NEW YORK
PHILADELPHIA
BALTIMORE
BIRMINGHAM
CINCINNATI
ST. LOUIS

MINNEAPOLIS
ST. PAUL
DULUTH
WATERTOWN S.D.
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FARGO, N. D.
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ESTABLISHED 1855

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PORTLAND, ORE.

TACOMA
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MEMPHIS
DALLAS
WINNIPEG, MAN.

GURNEY

HOT WATER HEATERS, STEAM BOILERS, RADIATORS

THEY GIVE COMPLETE SATISFACTION
Send for latest Catalogues
GURNEY HEATER MFG. CO.,
12 East 42nd Street NEW YORK
188-200 Franklin St., Cor. Pearl BOSTON, MASS.

PERFECT FOR HOT WATER OR USE UNDERGROUND

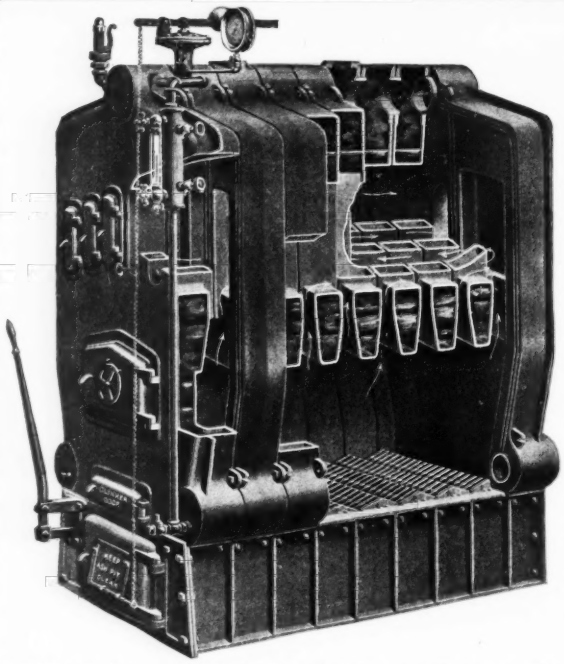
"CLEVELAND"

COMPRESSION STOP AND WASTE VALVES

These valves are so constructed that a slight turn will open the valve and close the waste hole. ONE FULL TURN of the handle will completely open or shut the valve. These valves CANNOT LEAK OR STICK, and are **absolutely guaranteed.**

THE CENTRAL BRASS MFG. CO., Cleveland, O.

103878



NOT only do you get a line on fire travel and waterways in this cut-away view, but the water line and steam dome.

Davis Sectional BURNHAM BOILERS

For Steam or Hot Water

TO get right down to the facts of the case, the superiority of the cast iron boilers over wrought iron is summed up like this:

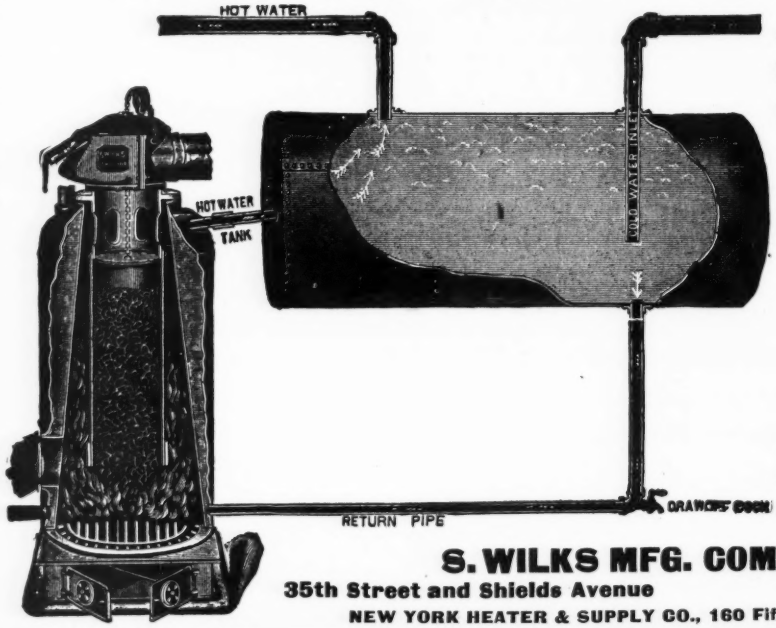
—They last three times as long.
—Consume less coal for equal returns.
—Require no bricking.
—Are easier to repair. —Are safer.

In the last 20 years the whole heating boiler proposition has been reversed, now 90 per cent in use are **Cast Iron**, leaving an almost unmentionable 10% on the wrought iron side.

For catalogue and particulars write

THE JOHN DAVIS CO.
CHICAGO
22nd and Halsted Streets

WILKS HOT WATER HEATERS



For Heating Water for

Residences, Apartment buildings, Hospitals, etc.

Steel Storage Tanks

DRAWING BOOK Send for our New Catalogue

S. WILKS MFG. COMPANY
35th Street and Shields Avenue CHICAGO, ILL.
NEW YORK HEATER & SUPPLY CO., 160 Fifth Ave., New York City

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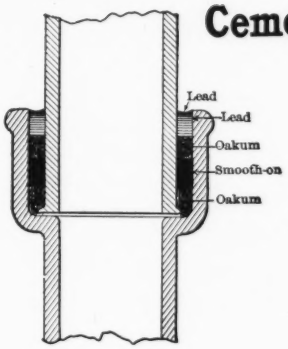
SMOOTH-ON
TRADE MARK

Iron Cement

For Soil Pipe



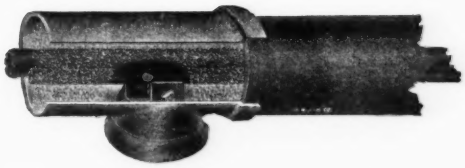
Write for 100 page book, showing how to make lead joint without caulking lead.

RED LABEL FOR PLUMBERS

SMOOTH-ON MFG. CO.

JERSEY CITY, N. J.

CHICAGO OFFICE: 61 North Jefferson Street.



Insulate your underground pipes with **Portland Sectional Conduit** and you can heat your buildings at far less cost. This Insulation has an efficiency of 88 per cent and is vastly superior to wooden or masonry conduit. **Portland Sectional Conduit** lasts indefinitely. Minimum cost of maintenance.

Write Nearest Branch for Descriptive Booklet

H. W. JOHNS-MANVILLE CO.

Manufacturers of Asbestos and Magnesia Products, Asbestos Roofings, Packings, Electrical Supplies, Etc.

New York, Boston, Pittsburg, New Orleans, Milwaukee, Philadelphia, Cleveland, Kansas City, Chicago, St. Louis, Minneapolis, Los Angeles, Seattle, San Francisco, Buffalo, Baltimore, Dallas (532)

Have you considered the advantages in a DIE STOCK with DIES ADJUSTED by hand, such as

The "DUPLEX"

Threads go together just as desired. Over or slightly under standard size always obtainable, no difficulty in compensating for wear. Inquire of

THE HART MANUFACTURING CO.

9 WOOD ST., CLEVELAND, OHIO

Hanna Ball Joint Pipe Hanger

SIMPLEST

No. 1.

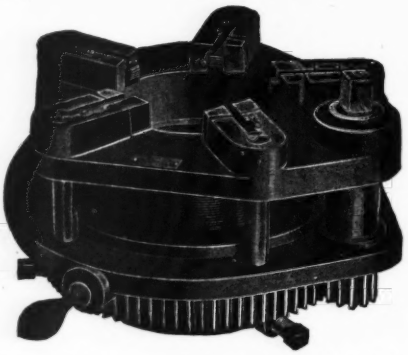
MADE OF MALLEABLE IRON, CARRIED IN STOCK AND FOR SALE BY ALL SUPPLY HOUSES.

STRONGEST

The Penn Engineering Company

Philadelphia, Pennsylvania

Important Announcement



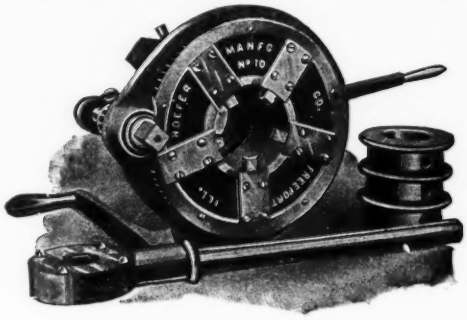
This is our No. 3 Machine. Capacity from 4½ to 8 inches inclusive.

We are now prepared to furnish a new machine (designated No.4) with a capacity of 9, 10 and 12 inch pipe. In general appearance and mode of operation, this new device is identical with our No. 3 as shown above and will only weigh about 25 lbs. more. WRITE FOR INFORMATION.

The Toledo Pipe Threading Machine Co.
TOLEDO, OHIO

Competition makes it necessary to cut threads cheaply. Why not use

The "Hoefer" Adjustable Pipe Threading Machine



because it cuts a standard taper. Can cut a running thread after the standard taper has been cut by simply loosening a screw. Can cut over and under standard size—all with one set of dies.

NO CHANGE OF DIES NECESSARY

WRITE FOR PARTICULARS

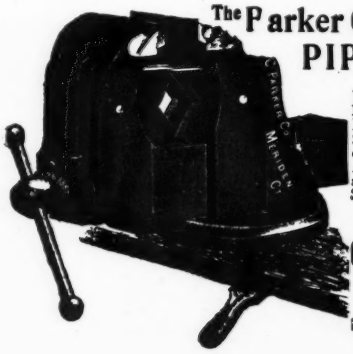
HOEFER MFG. CO., Freeport, Ill.

Armstrong Quality

is found in the hinged vise as in all other pipe-working tools. Made of best malleable iron with interchangeable crucible steel jaws.

Send for complete catalog of Pipe Fitting Tools.

The Armstrong Mfg. Co.
284 Knowlton St., Bridgeport, Conn.



The Parker Combination PIPE VISE...

Especially adapted to Plumbers and Steam Fitters use. Made in Six different sizes and every Vise all right. Ask for the "Parker" and you get a good tool Sold by jobbers.

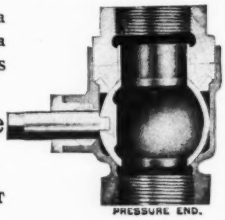
The
Chas. Parker Co
Factories:
MERIDEN, CONN.
New York Sales Rooms,
32 Warren St.

"Huxley" Is The One

Adapted for all purposes where a quick, full, straight opening and a positive joint are desired. Works under 200 pounds or less.

Huxley Blow-off Valve
None can compare with the Huxley

Made from 1 1-2 to 3 in.
CATALOGUE FREE ON REQUEST
Mentioning This Journal



Huxley Valve Co., 145 Main St., Buffalo, N.Y.

PIPE FITTINGS AND VALVES FOR THE HEATING AND PLUMBING TRADE

TRADE (S) MARK

JOHN SIMMONS CO.
104-110 Centre Street, NEW YORK.

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

Famous Imperial Boilers

"IMPERIAL"

We want every steamfitter to have our new catalogue of Imperial Boilers—and learn all about this wonderful line of Sectional and Round Steam and Hot Water Boilers. There are no better boilers made at any price. Send for catalogue to-day.

Utica Heater Co., Utica, N. Y.

Chicago Representatives,
Chicago Heater & Supply Co., 56 and 58 Dearborn St., Chicago, Ill.

The "Ideal" Wrench

Every Steamfitter ought to read all about this Tool

IT'S A TIME SAVER

Write for booklet which describes in detail the six points of superiority over any other wrench.

KROESCHELL BROS. CO.
47 ERIE STREET CHICAGO

Stage diamonds are called "diamonds" same as the real sort, but they won't pass muster when put to the test.

Lots of pipe threading tools are called "pipe dies" too—but when you compare them to the Nye die—when you test 'em side by side—you'll wonder why any one has the nerve to call them "pipe dies".

Nye dies cut with half the power required for other dies,—they create only half the friction,—hence only half the work—They cut pipe threading labor, cost and time in half. I guarantee them and offer them on 10 days' free trial to the suspicious jobber or user.

Write Me "NYE"

Nye Tool & Machine Works
196-198 So Clinton Street
CHICAGO
Illinois

Utilize The Exhaust Steam

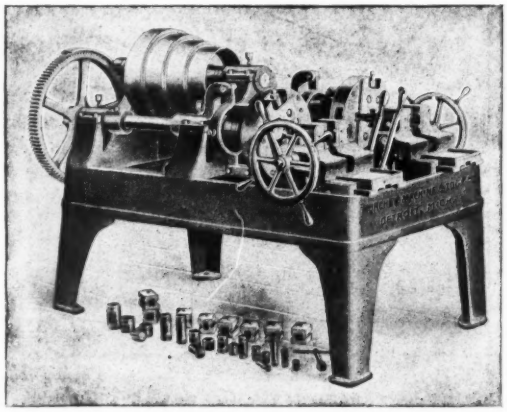
Otherwise Nearly 90 Per Cent of the Energy Extracted from Fuel is Lost

THE MOST PRACTICAL and most profitable economy in a power or light plant is the utilization of the exhaust steam. This fact presents a valuable opportunity to create a District Steam Heating Plant without a sensational increase of the original investment, by installing our system of **District Steam Heating.** Thirty years' experience has made our system perfect. We invite correspondence with those interested. Send for our new sixty page booklet. It is Free.

American District Steam Company

Main Office: LOCKPORT, N. Y. **Western Office: Monadnock Bldg., CHICAGO**

Canadian Office, 77 York Street, Toronto



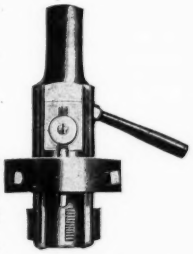
Murchey No. 2 Nipple and Pipe Threading Machine

will thread and ream complete 2,000 ¾ in. short or long nipples in 10 hours. A trial of our machine will prove this assertion.

A Pointer

The earning capacity of a machine is what counts. Investigate this point before you buy elsewhere.

Murchey Patent Automatic Collapsing Tap and Reamer Combined



Collapses automatically at the end of thread, saving time and danger of spoiled work; durable, easily sharpened, can be set to cut over or under size threads and is adapted for all kinds of tapping machines and turret lathes.

WRITE FOR CATALOGUE TODAY

Murchey Machine & Tool Co., Porter & Fourth Sts., Detroit, Mich.

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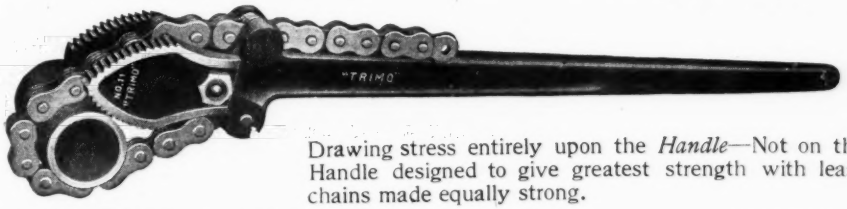
"Trimo" Strongest of all Chain Wrenches



Gold Medal
St. Louis, 1904.

Sent Free: Catalog No. 42. Write for it.

Drawing stress entirely upon the *Handle*—Not on the Jaws, *that is why*. Handle designed to give greatest strength with least weight. Jaws and chains made equally strong.

TRIMONT MFG. CO., 55-71 Amory St., - - ROXBURY, MASS., U. S. A.

NO LEAKS

Never spoils in packages

Never cracks or lets go

No Leaking Roofs for 20 Years

By using **Callahan's Rubber Roof Cement.** In use by the U. S. Government. Soldering fluid for plumbers and roofers. Non-poisonous. Send for catalog.

Geo. Callahan & Co.

Factory 218 Front St. **129 Front St., New York**

AUXILIARY HEATING SECTION

is also in use for heater for utilizing exhaust heat of gasoline engines

Anderson-McCutchen Co., Peekskill, N. Y.

EASY WORKER

SOLVED BY THE

BEAVER DIE STOCK

1" TO 2"

WITHOUT CHANGING DIES

SAVES TIME

DO THIS

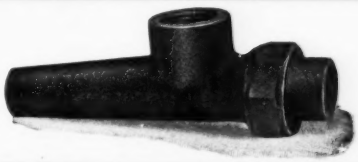
Thread one end of a 2 inch pipe all alone with the Beaver, then thread the other end with an ordinary stock (if you can). Then change dies in each stock to cut say 1 inch and note the time saved with the Beaver—these two points will surprise you. Use the stock 10 days and if you can afford to part with it just tag and return

(Free trial from your jobber or us.)

Dept. B. THE BORDEN COMPANY, Warren, O.

"FLAGG" Malleable Fittings

"FLAGG" Water Back Tee



PIPE FITTINGS AND VALVES

TRADE S MARK JOHN SIMMONS CO. TRADE S MARK

110 CENTRE STREET, WHEN WRITING MENTION DEPT. D.E., NEW YORK.

PITTSBURGH VALVE & FITTINGS CO.

Manufactures and carries in stock a complete line of the following:

Standard Screwed Fittings
Standard Flanged Fittings
Extra Heavy Screwed Fittings
Extra Heavy Flanged Fittings
Long Turn Screwed Fittings
Long Turn Flanged Fittings
Recessed Drainage Fittings
Malleable Iron Fittings
Iron Body Gate Valves
Iron Body Blow-Off Valves
Brass Wedge Gate Valves
Expansion Joints
Steam Traps
Pipe Hangers

WORKS, BARBERTON, OHIO

Address all communications to General Office, Frick Bldg.

PITTSBURGH, PA.

No Waste.

"I did well with that leg of veal," said Mrs. Closely. "First as a roast, then cold, then as hash, then in croquettes, and at last for soup. But Mary gave the bone to a dog, before I got the marrow." Now with the

WEBSTER FEED-WATER HEATER AND PURIFIER

even the bone doesn't go the dog. After using the steam for power, then for heating feed-water, then for heat ng buildings or drying-coils, all the drips, still hot, go to feed the boilers.

Its economy is very great.

Write to-day for booklet 2 F.

WARREN WEBSTER & Co.
CAMDEN, N. J.

Ricketts Thermostatic Valve

This has a *Mercury Seal*, which means *absolutely positive* cut off. No valve seats, no springs, no expansion rod to strain, *simply mercury*. Lasts forever, *impossible* for mercury to get away.

Unconditionally Guaranteed

Give us an order and prove it, also send for description.

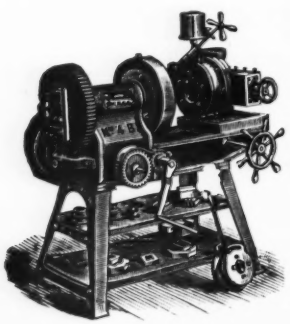
RICKETTS & CO., Dayton, Ohio

A Help to the Plumber, Steam and Gas Fitter, Engineer, and All Iron Workers is

STICK-TO IRON CEMENT

SAMPLES FREE. Manufactured by

THE A. WILHELM CO.
Reading, Pa.



No. 4-B Pipe Cutting and Threading Machine ⅛ in. to 4 in. Hand or Power.

SAUNDERS the STANDARD

The claim of many makers is: "As good as Saunders". Get the standard at first by buying the Saunders tools.

Our stocks and dies are light, strong and of superior design and finish. Send for catalogue.

We make Pipe Cutting and Threading Machines to cut and thread up to 18 inches O. D.

D. SAUNDERS' SONS, 35 Atherton St., YONKERS, N. Y.

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NORRISTOWN MAGNESIA
AND ASBESTOS
COMPANY

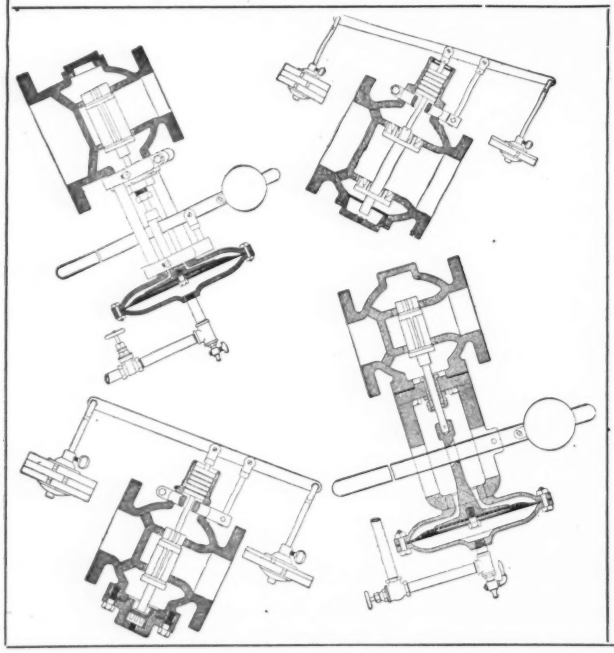
Leading
Manufacturers
of Highest Grade
Coverings for
Steam and
Hot Water Plants.

Write for Catalogue Today

Norristown, Pa.

Selling Agents
in all
Large Cities

A Square Deal to the Trade on Prices



We have no agents to pay commission to.

MONASH REDUCING Valve prices are RIGHT and remain the same whether specified or not.

Piston and Diaphragm for all styles of heating Systems including Paul Steam System and Warren Webster System.

Write for set of blue prints and discounts.

MONASH-YOUNKER CO.
NEW YORK CHICAGO

Quality Radiators

Try every other make and you'll not find radiators that surpass

Novus and Solus

Regardless of claims made for any other style we guarantee and can prove that our radiators are the equal, under any conditions, of any manufactured. Don't doubt our word for it but make inquiries of those who are satisfied buyers or owners of heating plants on which SOLUS and NOVUS radiators are in use. Send us your name and address and we will send you a copy of our art catalogue—a catalogue in keeping with the excellence and completeness of our line.

National Radiator Company, Johnstown, Pa.

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

PROFITS

Large and Satisfactory

CAN READILY BE MADE IN HANDLING

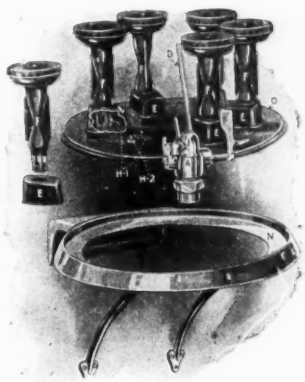
This is the No. 6

Price $29.00

Height 29½ inches, Diameter 12 inches. Price does not include supply or outlet pipes.

Humphrey Crescent Instantaneous Water Heaters

There are many Improvements in them. This shows our new drawn steel shelf and burner. The burner and water parts can readily be moved to any angle on the shelf.



We have heaters for every purpose. Tell us your requirements. Every heater is guaranteed.

No. Heater	Gas Supply from Meter	Heats Gals. per Min. 50° in Temperature	Height	Diameter	Shipping Weight	Price*
Non-Contact 2	¾ inch	2½	34½ inches	12 inches	70 pounds	$40 00
" 1	¾ inch	2	31 inches	10½ inches	62 pounds	34 00
Contact 6	¾ inch	3	29½ inches	12 inches	60 pounds	29 00
" 8	¾ inch	2½	28½ inches	10¼ inches	48 pounds	23 50

Our new catalogue illustrates the complete line of these heaters. Sent free on request. We quote liberal discounts and help you make sales. Why not send us your orders? We make prompt shipments.

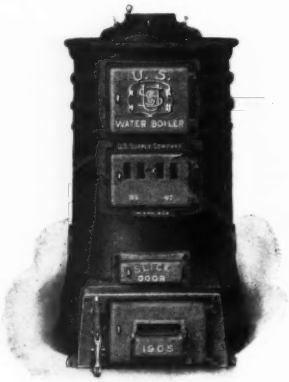
Humphrey Co., - - Kalamazoo, Mich.

The only manufacturers in the World of a COMPLETE LINE OF INSTANTANEOUS WATER HEATERS.

United States Supply Co.

Omaha, Neb.

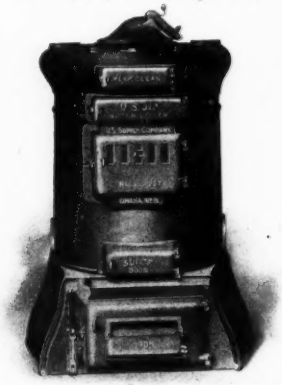
"U. S." WATER BOILER



RIGHT PRICES
PROMPT SHIPMENTS
RELIABLE GOODS
OMAHA

NINTH & FARNAM STS.
(New Location)

"U. S. Jr." WATER BOILER

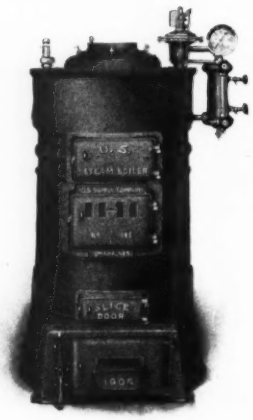


All "U. S." Boilers are constructed specially with a view to producing maximum results with minimum consumption of fuel. Fire pot is so arranged as to insure perfect combustion.

Good Lookers and Good Workers

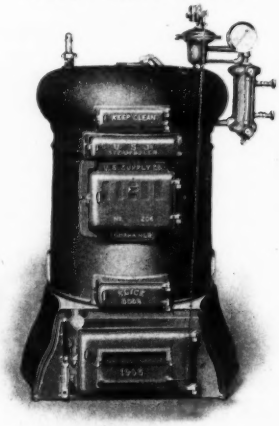
Low-down types of structure so as to permit erection with freedom in cellars where a good many other boilers would necessitate the use of a pit. Smoke pipe is taken from *back* of dome. Every Boiler is set up and tested thoroughly before shipment to customer.

"U. S." STEAM BOILER



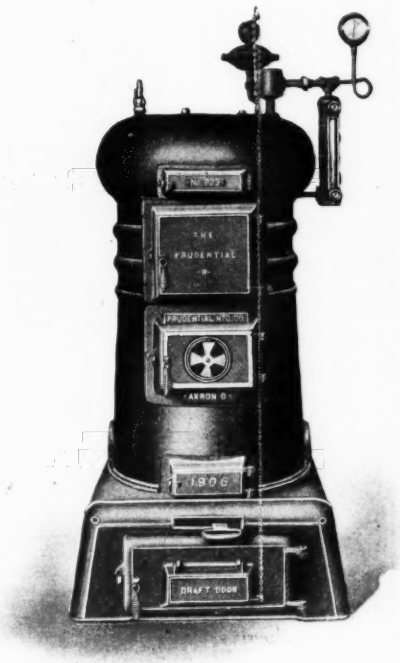
A Large Stock Always Ready for immediate orders. Promptness Guaranteed. Sales doubling and trebling every year. If you have not made your year's connection, *write us today* for Catalog and Terms.

"U. S. Jr." STEAM BOILER

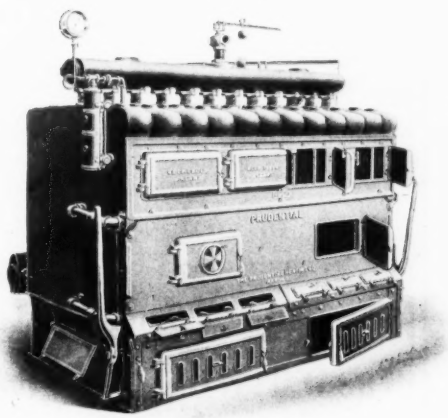


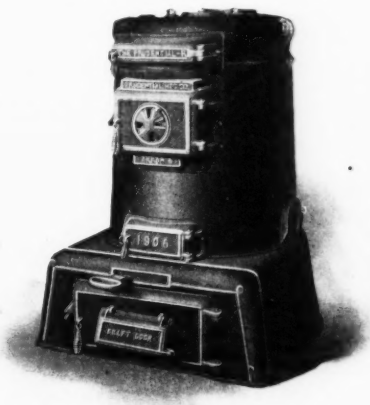
THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

Get Both Eyes on These



There is something in it. This is not a house to house canvass line. Just a square deal for the practical heating engineer who has been years building a business and reputation.





Catalogue and price list upon request

PRUDENTIAL HEATING CO., Akron, Ohio

Important

REFERRING to the widely advertised announcement of the Powers Regulator Company of a decision against us, we desire to advise our friends that this decision is merely a preliminary step in the litigation; the case will be taken at once to the Circuit Court of Appeals for final adjudication. We confidently expect a favorable decision by the Court of Appeals.

The subject matter in litigation relates solely to the *graduated* control of *double dampers* in *heating* and *ventilating* systems. There has been no claim made that our *thermostats* are infringements, or that our apparatus for controlling *steam* or other *valves* or dampers on *heaters* or dampers under *tempering coils*, are an infringement; nor has our right to use thermostats on double dampers been questioned, so long as the dampers move continuously to the open or to the closed position, and do not stand in intermediate mixing positions.

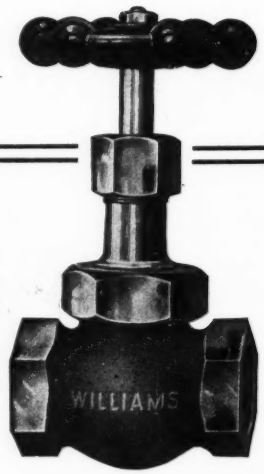
We stand ready to protect our customers against infringement suits by any and all parties whomsoever.

Respectfully,

The National Regulator Company

334 Dearborn Street
CHICAGO

1135 Broadway
NEW YORK CITY



"Williams" on Valves means Quality

In many more ways than one;

Longer life and better results—

Less repair work to be done.

Insures the best of service

And less trouble on the line;

Make no mistake when ordering

Specify **"Williams"** every time.

The D. T. Williams Valve Co.
CINCINNATI, OHIO

Complete Catalogue of "WILLIAMS" Engineering Specialties sent free upon request.

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

Price vs. Quality

Most men are critical regarding price; few give quality the consideration it deserves when buying Employers' Liability Insurance. This should not be. The quality of your insurance is more important than its price. You should no more buy cheap insurance than you would buy cheap machinery—either is apt to fail you when needed most. In both cases results are what count.

The only policy you should accept is that which is conditionless, easily understood, and backed by a company with notable financial strength and a record for furnishing service. In other words, buy

The Perfect Form of Liability Insurance

sold only by this Company. Our booklet Form 260-E may be the means of saving you money. Write for it today.

MARYLAND CASUALTY COMPANY

Assets $3,691,447.50. BALTIMORE, MARYLAND. Surplus to Policyholders $1,722,046.77.

The Maryland continues to sell, at fair rates, the Standard Form of Liability policy, which is as good as the best sold by any other company.

MARYLAND CASUALTY COMPANY
MERITS COMPLETE CONFIDENCE

The Company also writes Steam Boiler, Water Damage, Physicians' Defense, Plate Glass, Disability, Health, Fly Wheel, Burglary, Sprinkler Leakage, Teams, Elevator, and all other classes of Casualty Insurance.

IMPORTANT

Users of Temperature Controlling Apparatus

ARE HEREBY NOTIFIED

That in the case of THE POWERS REGULATOR COMPANY vs. THE NATIONAL REGULATOR COMPANY in the United States Circuit Court, Northern District of Illinois, a decision was rendered on March 15, 1907, sustaining the patent of The Powers Regulator Company and declaring infringement of same by defendant. An injunction and accounting is ordered.

THE POWERS REGULATOR CO.

111 FIFTH AVE., NEW YORK CITY 40 DEARBORN ST., CHICAGO

THREE EXCLUSIVE FEATURES OF THE

Homestead Automatic
WATER HEATER

SIMPLICITY

By simply lifting latch, and removing the front casting, exposes to view the interior, every part can be removed without detaching heater from connections, all parts being interchangeable.

EFFICIENCY

The one piece double burner, with coil arrangement, allowing the gas to directly impinge all parts of the coil, thus quickly heating water to a high temperature, with a minimum amount of gas

DURABILITY

The *Homestead Water Heater* being all cast iron, and the coils 18 gauge copper tubing, warrants the life of the Homestead Heater, no parts subject to corrosion. Write for booklet.

Homestead Heater & Mfg. Co.
HOMESTEAD, PA.

Less than 20 Feet of Gas Required

The Peer Kitchen Boiler Heater

is a boiler stand with a self-contained heater. You do not have to educate people all over to get them to use it. People are used to range boilers, and they can see this is an improvement. The tank can be heated from top to bottom with less than 20 feet of gas. No other heater can compare with this. Let us send you our booklet today. Write for particulars.

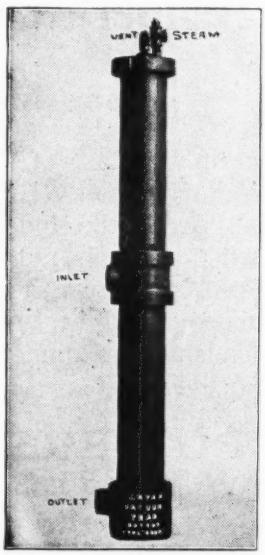
The Peer Water Heater Co., Inc.
39 STATE ST., CHICAGO
Fernando W. Pripps Co., 131 Oneida St., Milwaukee, Wis. Geo. R. Ives, 423 West 7th St., Los Angeles, Cal. G. W. Burchard, 412 Main St., Kansas City, Mo.

The Famous Niagara Automatic Water Heater

Regulated by a Thermostat so as not to raise the temperature of the water above a specified degree. Uses gas for fuel and is very economical. Will not precipitate lime or other minerals and form an incrustation to clog up the heater. Send for our booklet. It is free. Address all letters to

Hammond-Homberger Co.
SILVER CREEK, N. Y

VACUUM HEATING



is the coming

System

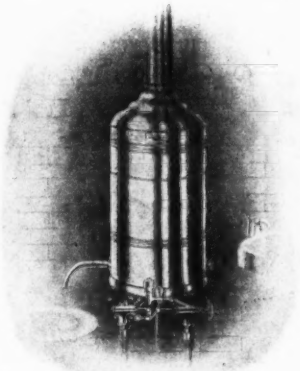
I have one

that works

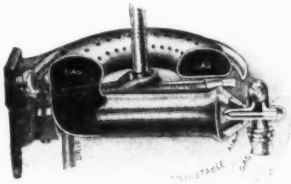
Write for Booklet "A"

E. J. Ryan
117 Walnut Street
Danville, Ill.

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. **TURN TO PAGE XXX.**



MODEL "D" WITH VENT PIPE



"D" Burner—only one burning all kinds and pressures of gas successfully—only visible pilot light—in fact the most simple and perfect burner in existence.

Rapid BATH HEATER

Model "D" and "C" With and Without Vent Pipe

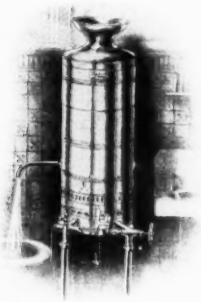
Our New Model "D" heats more water per minute than any vent pipe heater made—has largest capacity and simplest in construction.

Price?

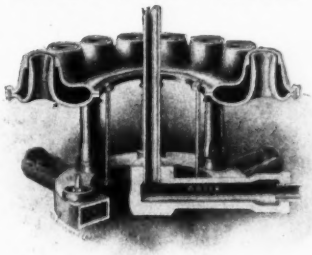
You will be surprised when you get our dealer's prices, they are *right* and heaters *best ever.* Send for prices and full information at once

Rapid Heater Co.

Grand Rapids, Mich.

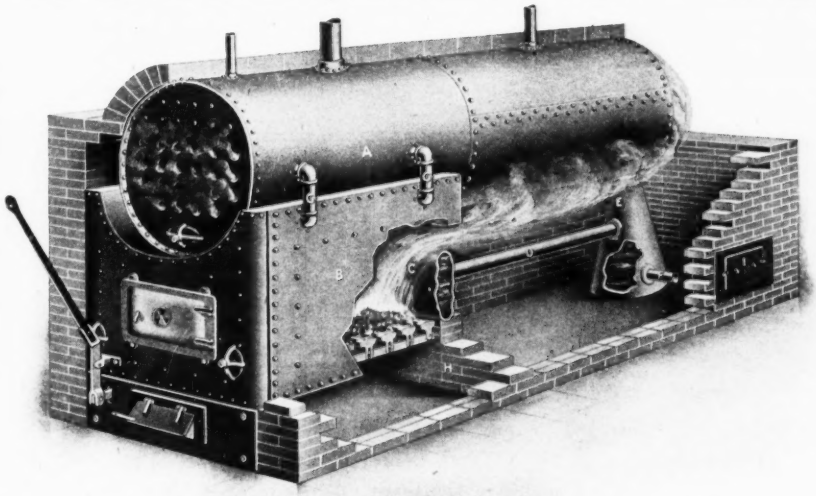


MODEL "C" WITHOUT VENT PIPE



"C" Burner—only double aerated burner made and the only one that can be used without vent pipe.

COAL IS GOING UP!



In most Boilers that is all it does do.

See the "Herbert Detached Fire-box Boiler" in action and you see the coal giving as nearly perfect results as has yet been obtained in any boiler—Why?—Combustion.

We eliminate 50 per cent of the Smoke produced by the ordinary Fire-box Boiler — and Smoke is waste Heat.

Poor Combustion—Black Smoke.

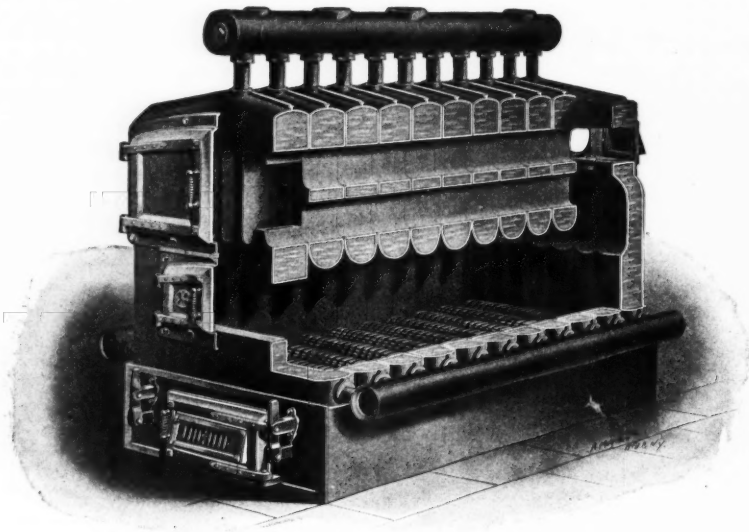
Good Combustion—No Smoke.

Easy to Clean-Easy to Handle. Easy to Sell. New catalogue on Press—Send for it.

Telephone Yards 734

HERBERT BOILER CO., 240 Root St., CHICAGO

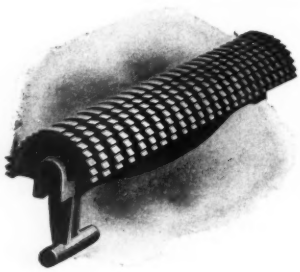
The Mercer Boiler



SECTIONAL VIEW

FOR

Steam and Water Warming



THE REED
(Patented)
Rotating Grate

Used in all Mercer Boilers

THE H. B. SMITH CO.
BOILERS and RADIATORS

WORKS
WESTFIELD, MASS.

SALESROOMS
133 Centre Street, New York, N. Y.
728 Arch Street, Philadelphia, Pa.

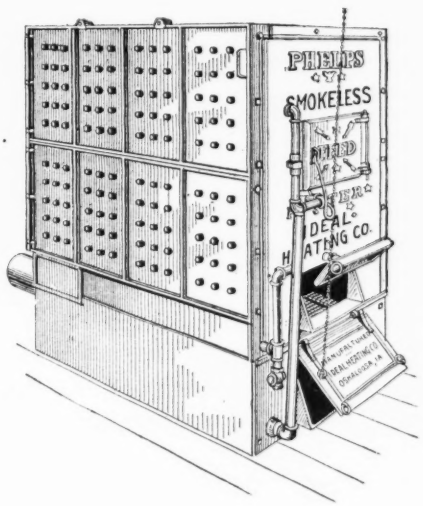
THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

PHELPS

Smokeless Heaters

STEAM OR HOT WATER

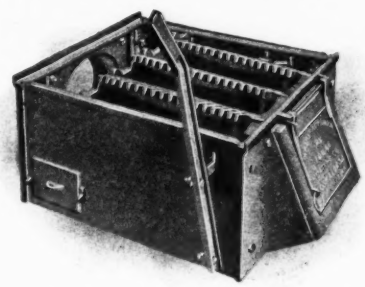
Burn 91.11 per cent of Combustible Elements of Soft Coal, Saving more than half in Coal Bills



Cased up, ready for the piping and asbestos boiler cement.

See Those Grates?

Nearly two-thirds of the entire surface is air space. The ash pit is sixteen inches deep. Even our competitors admit that we have the best grate on the market.

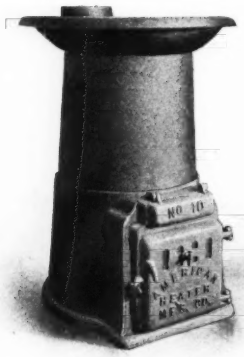


Every part is easily reached from the klinker door. Smoke pipe opening at the bottom, making a complete Base Burner of the Heater

We issue a written guarantee with each heater sold, agreeing to refund the purchase price of any Phelps Smokeless Heater or Boiler that gives off the black smoke like other heaters or boilers, or gathers soot inside to be scraped off like other heaters and boilers do. A copy of this guarantee will be mailed to anyone on request.

THE IDEAL HEATING COMPANY

Write for particulars Oskaloosa, Iowa



Rococo Heaters

In Design, Name and Ornamentation

Steam or Water

Capacities

Water . . 65 ft. to 8,000 ft.
Steam . . 500 ft. to 5,300 ft.

The Rococo Heater is faultlessly manufactured.

All parts fit perfectly.

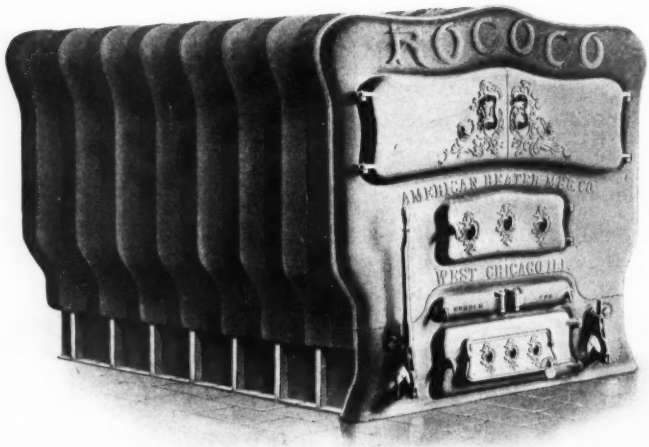
The sections are clean and smooth.

The doors are well fitted and conveniently located.

All core sand is removed and each section tested and approved.

The centers of push nipples are uniform and exact.

Made either with Push Nipple or Header



Their heating ability is marvelous.

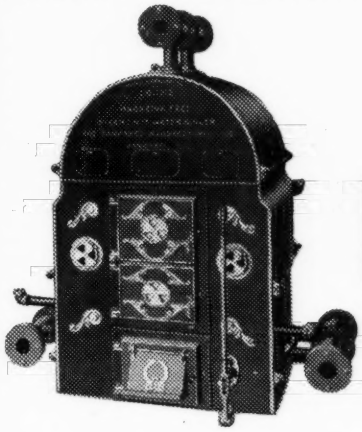
For economy in fuel they satisfy all.

Prices Right.

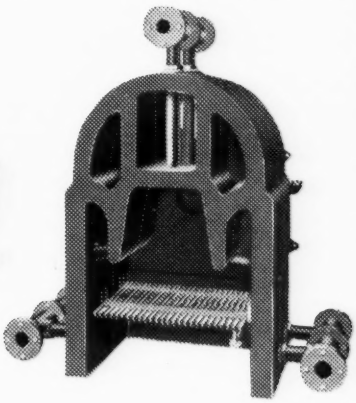
American Heater Mfg. Co.

West Chicago, Illinois

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.



LOOK!



We herewith present two views of our Steam and Hot Water Boilers suitable for residences and public buildings.

You never saw anything like it before, and you never put in a boiler that will give such complete satisfaction.

NOTICE THE FOLLOWING :—

Its handsome appearance,
Its perfect circulation,
Simplicity of construction,
Its long fire travel,
Magazine Feed or Surface Burner
Enormous amount of direct exposed fire surface.

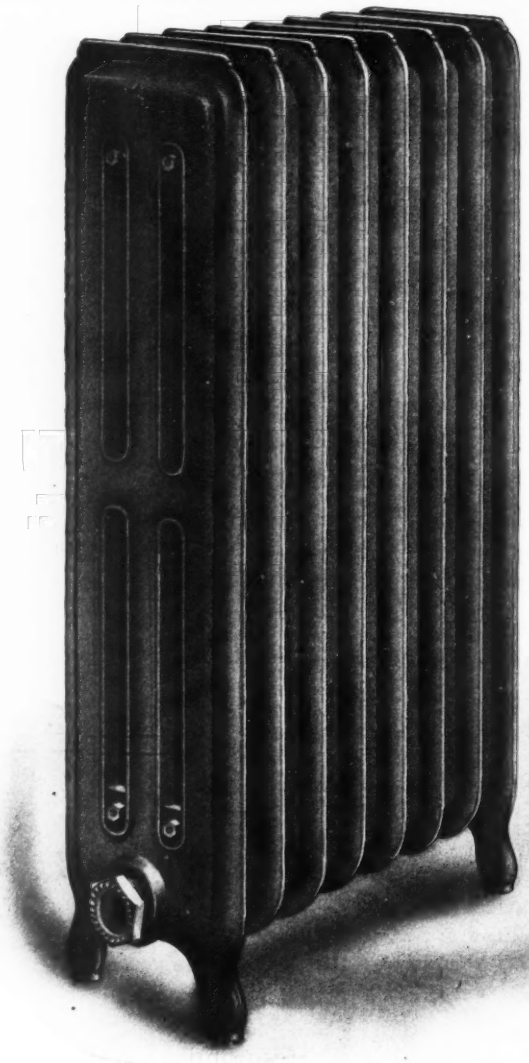
Furthermore, it is—

Sootless, Smoke Consuming, Economical and will burn any kind of fuel. Every boiler is equipped with a tank heater which always insures plenty of hot water.

If you want to build up your heating trade and hold it, try one of these boilers. Send for catalogue and prices.

KANKAKEE MANUFACTURING COMPANY

KANKAKEE, ILLINOIS



"CORINTH"

Plain Radiation

For use in schools, hospitals, office and public buildings—many owners and architects prefer it for residences. We can furnish it in all standard heights with as many loops as desired in TWO or THREE column.

The uniform, smooth casting, seamless nipple joints and properly inclined heating surfaces make this a superior radiator to other makes.

Send for advance circulars

Kellogg-Mackay-Cameron Co.

BOILERS, RADIATORS, HEATING AND PLUMBING SUPPLIES

General Offices, "K-M-C" Building, Michigan Ave. and 12th St.

CHICAGO

100-106 Second St., So.
MINNEAPOLIS

639 New York Block
SEATTLE

Second and Main Sts.
KANSAS CITY

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

DO YOU WISH TO START THE SEASON RIGHT?
DO YOU WISH TO INCREASE YOUR BUSINESS?
DO YOU WISH TO MAKE LARGER PROFITS?
DO YOU WISH SATISFIED CUSTOMERS?

THEN PROCURE THE AGENCY
IN YOUR TERRITORY FOR THE

"MOLINE" VACUUM-VAPOR METHOD OF HEATING

ADAPTABLE TO THE SMALLEST AS WELL AS LARGE BUILDINGS

NO AIR VENTS ON RADIATORS. SMALL PIPING
NO EXPENSIVE RETARDERS TO NEED REPAIRING, ETC
NO MECHANICAL PUMPS REQUIRING OUTSIDE POWER
MOST RAPID CIRCULATION KNOWN. RETAINS HEAT

FROM FIVE TO TEN YEARS IN ADVANCE OF OTHER VAPOR SYSTEMS
PRICE OF ROYALTY & SPECIALTIES ABOUT HALF
WHAT OTHER GOOD SYSTEMS
CHARGE

FUEL AND LABOR SAVING FOR OWNERS MORE BUSINESS AND LARGER PROFITS FOR CONTRACTORS

"WONDERFULLY SIMPLE
SIMPLY WONDERFUL"

NEW DESCRIPTIVE "BOOKLET" NOW READY. WRITE AT
ONCE BEFORE AGENCY IN YOUR TERRITORY IS GIVEN OUT

MOLINE VACUUM-VAPOR HEATING CO.

320 SIXTEENTH ST., MOLINE, ILL.

SOLE OWNERS

PAT. UNITED STATES, CANADA, GERMANY AND ENGLAND

NO EXPERIMENT

THREE YEARS' ACTUAL EXPERIENCE ABSOLUTELY GUARANTEED

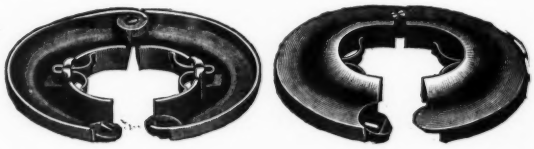
DO YOU KNOW that the

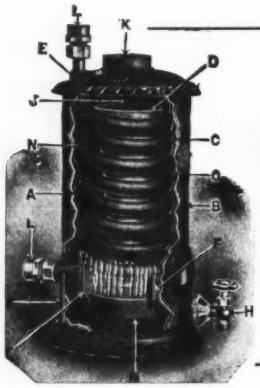
WRITE US TODAY

INSTANTANEOUS WATER HEATING CO.
153-159 South Jefferson Street, Chicago

Eight different styles of floor and ceiling plates ranging in size from ¼ inch to 8 inches. Carefully finished, all being coppered before nickeling. Send for catalog and prices to the old original company.

***The* Beaton & Corbin Mfg. Co.**
Southington, Conn., U. S. A.



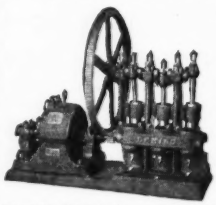


Lawson Improved Gas Water Heater

Is the most economical and up-to-date device on the market for furnishing hot water for household purposes. Send for booklet, giving full description.

Lawson Mfg. Co.
HOMESTEAD, PA.

PUMPING PROBLEMS



Electric Triplex Pump, designed for use in Apartment Houses, Office Buildings, etc.

DOMESTIC ENGINEERS and others interested in pumping problems should write for our CATALOGUE "G" illustrating our complete line of Single and Double Acting Triplex Power Pumps and Deep Well Working Heads and containing many valuable engineering rules and tables.

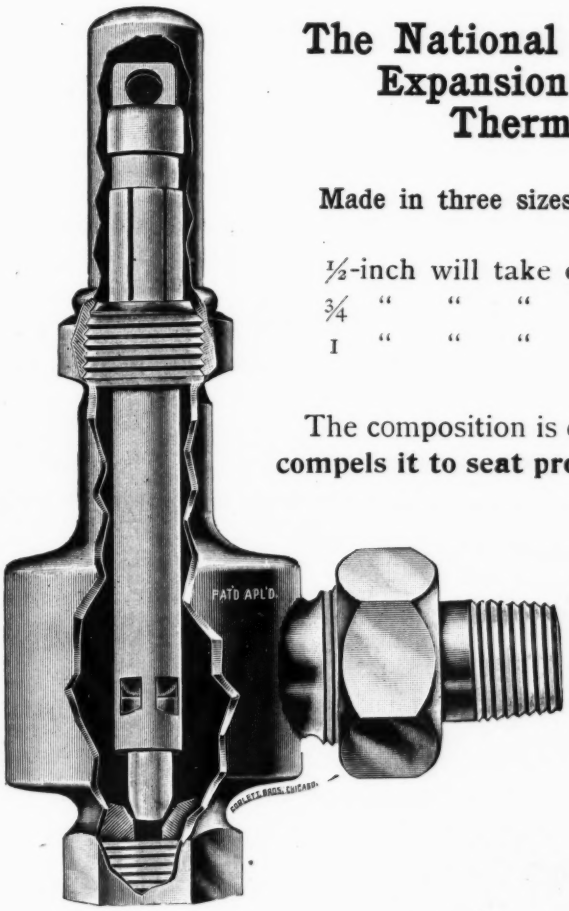
***The* Deming Co.** Salem, O.
Manufacturers of HAND and POWER PUMPS for all purposes.
HENION & HUBBELL
General Western Agents
61-69 N. Jefferson Street CHICAGO

Sanitation in the Modern Home Just off the press. Good reading and remarkably resourceful for the busy man who reads mostly for profit. Bound in cloth. Price, postpaid $2.00.
DOMESTIC ENGINEERING, 49-53 North Jefferson Street, Chicago

Post yourself on **Vacuum Heating**
MORCAN PATENTS
NEW LINE OF CATALOGUES WRITE AT ONCE FOR FULL PARTICULARS AND PRICES
CHICAGO MINNEAPOLIS **Kellogg-Mackay-Cameron Co.** SOLE OWNERS KANSAS CITY SEATTLE

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

It has proved a big success



The National Improved Automatic Expansion Steam Trap or Thermostatic Valve

Made in three sizes—½-inch, ¾-inch and 1-inch

½-inch will take care of 250 feet of radiation
¾ " " " " 500 " "
1 " " " " 750 " "

The composition is encased in a brass tubing, **which compels it to seat properly at all times,** and will not permit carbon to get out of shape. It also ensures greater expansion, as carbon can not swell out, and thus must expand lengthwise. The adjustment is not made by means of a screw, but carbon is held in place by spring friction. This does away with the possibility of cutting the seat by overscrewing, as is the case with other thermostatic traps.

The expansion member is composed of the most sensitive composition, and will respond readily to a difference of a few degrees of temperature. The trap is self-adjusting, thereby always securing the full capacity of the expansion. Can be used in connection with a vacuum system, on radiator heater coils, dry kilns, etc., also on drips from risers, and at the end of long runs of heating mains. Will work at any pressure from atmospheric to 75 pounds, with or without vacuum pump. MADE ONLY BY

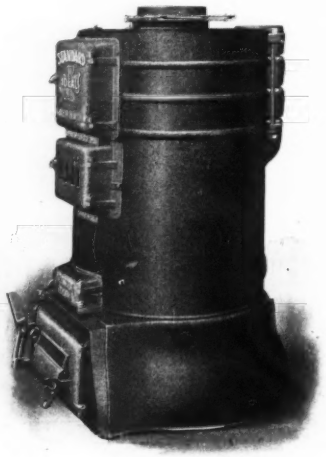
National Steam Specialty Company

230 East Washington Street, Chicago, Ill.

The Ideal Standard Water Boiler

LATEST PRODUCTION AND DESIGN

It has all the essential features and advantages of the best and most popular boilers manufactured in this country today. The tests that have been made by a score of experts have proven that it exceeds in efficiency our highest expectations as to Fuel Economy, Circulation, Cleaning of Flues and many other essential points about hot water boilers. We are prepared to make shipments on short notice in car lots or single orders, which promptness has increased our boiler business three fold during the past two years.

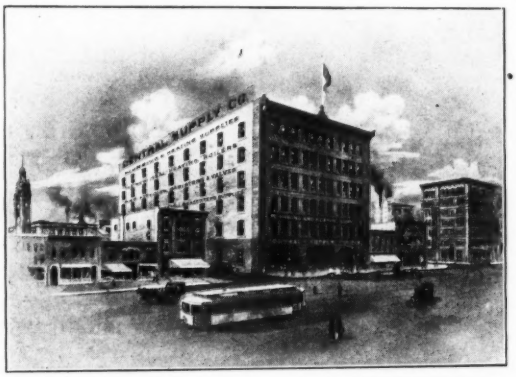


Remember we are exclusive selling agents.

Can be furnished with single or branch outlets. Made in 14 Sizes.

WRITE US FOR OUR LITERATURE and quotations before you make your year's connections.

You are cordially invited to visit our extensive display rooms



Manufacturers and Dealers in Plumbing, Heating, Engineers', Gas, Water and Mill Supplies

Central Supply Company

312-316 3rd Street, South **Minneapolis, Minn.**

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

The **BRAENDER**
Automatic

CELLAR DRAINER
and BILGE SYPHON

Operated by Water or Steam Pressure

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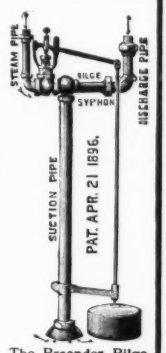
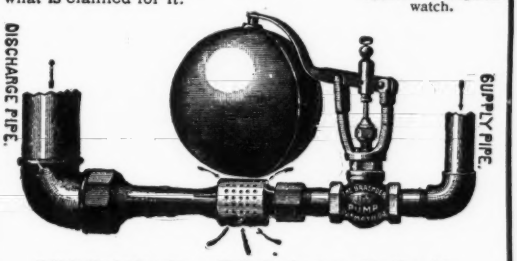


The Braender Bilge Syphon. Always on watch.



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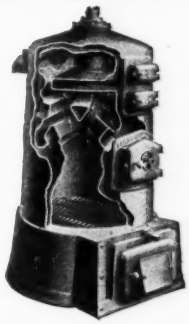

After Making Boilers

for fifty years, we have one that's hard to beat; here is the proposition: Cast the part above the base in one piece, doing away with all joints—make all waterways tend upward to reduce circulation friction—have all fire surfaces surrounded by water—a fire pot so deep that all gases are consumed—then a grate that works easy and smashes clinkers; these (and some other things) go to make up the "Burnham" Round Boiler for steam and hot water. Send for catalog.

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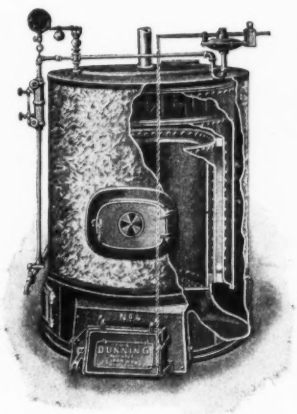
Boston; 818 Tremont Building. Phila.; Keystone Supply & Mfg. Co. Chicago; Chicago Heater & Supply Co. Providence; Allen & Reed, Inc. Minneapolis: Roberts Heating & Ventilating Co.

The Cracked Section
The Nightmare of the Cast Iron Boiler



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Siemans-Martin (open hearth process) upon specifications and requirements of U. S. War and Navy Depaatment.

Steel is tough, strong, ductile, elastic and malleable, and **will not crack.**

May we send you this season's catalogue? *It will help you to do more business.*

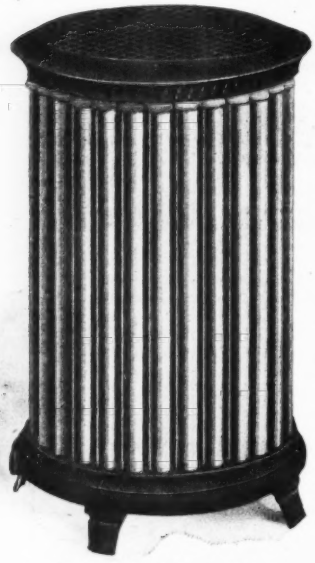
NEW YORK CENTRAL IRON WORKS CO.
GENEVA, NEW YORK

AN INTERVIEW

Radiator Salesman: "Good morning."

Prospective Customer (gruffly): "Good morning."

R. S.: "I understand you expect to use some radiation this year, and I would like to explain the merits of wrought tube radiation."



Round Wrought Tube Radiator.

P. C.: "Of what?"

R. S.: "Of wrought tube radiation. Haven't you ever used any?"

P. C.: "Don't know that I have. What is it, anyway?"

R. S.: "It is the good old original radiator—welded wrought tubes, screwed into a strong cast iron base with heavy return bends at the top and a nice, neat top to surmount it all. The best and most efficient radiator yet produced."

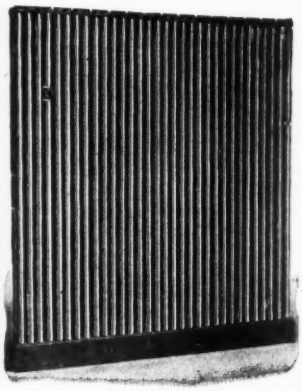
P. C.: "Humph! What's the advantage over any other radiator? A radiator's a radiator, isn't it, and if it radiates heat it *can't* do any more, can it?"

R. S.: "Do you smoke?" (Offers a cigar and lights up himself.)

P. C. (accepting same): "Don't care if I do." (Lights cigar and takes a few puffs.)

R. S.: "Now, it so happens that the cigar I gave you is one of the 'quarter each' kind. If, however, you think 'tobacco is tobacco,' then a 'Christmas gift' or 'election' cigar would have served the same purpose as far as you are concerned, wouldn't it?"

P. C.: "Great Scott! If you had offered me a cabbage-leaf—well, I would have consigned you to a place where they don't need radiators."



Staggered Tube Radiator.

R. S.: "Precisely. And in the same way there are radiators and then again there are RADIATORS. The wrought tube is the 'quarter each' kind."

P. C.: "How do you figure that out?"

R. S.: "In the first place, the heating surface is largely 1″ pipe, and is cut into small sections and is made more effective because there is so much more circulation of the air to be heated. The sections being small and thin, the wrought tube radiator starts to heat from the moment the steam strikes it. A man need not be a heating expert to know positively he is getting the actual amount of heating surface that he purchased."

P. C.: "Sounds all right. How much is fact and how much is salesman's 'buncombe?'"

R. S.: "It is all fact. We have wrought tube radiators which have been in continuous use for over thirty years, and they are still giving excellent service. Then there is this fact—wrought tube radiators take less space for the same heating surface than cast iron radiators do."

P. C.: "Humph! Is that much of a help?"

R. S.: "Most certainly. Do you want to take up more space than necessary with your radiators? That's what you build for, isn't it?—that is, to get space, and you don't want to take up any more than necessary with radiators?"

P. C.: "Maybe you are right. I certainly want all the space I can get. What other advantages have you?"

R. S.: "Well, the breakage in the shipping of wrought tube radiators is much less than on cast iron. The bases are thick and strong and the tubes are firmly screwed into them. Then again, being made for the most part of wrought tubes, radiators of this type are about twenty-five percent lighter than cast iron, which is a decided advantage, especially when a large number are to be installed on every floor and in various places in a large building."

P. C.: "Any further advantages?"

R. S.: "Well, there is one fact I might mention. Wrought tube radiators are *underrated* as regards catalog efficiency, wheras the other kind are *overrated*. Conservative estimates

Three Row Wrought Tube Radiator.

have indicated that, rated foot for foot, wrought tube radiation is much more efficient than cast iron. In other words, in wrought tube radiation you get more than you pay for—based on catalog rating of efficiency."

P. C.: "Well, it looks as though you had a good thing. You say you have customers who have used your radiators over thirty years and still like them?"

R. S.: "We certainly have, and steamfitters continually tell us that if they had their way they would install nothing else but wrought tube radiators, because they are the best and most efficient radiators on the market."

P. C.: "Humph! I want the best. I am going to put up a fine building and nothing but the finest in the land is good enough for it. I guess you can tell my architect to specify 'Wrought Tube Radiators.' Here's my card. How will he know where to get them?"

R. S.: "He can cut out the coupon which appears in 'Domestic Engineering' and send it to us."

P. C.: "All right. Good morning, young man; glad to have met you."

R. S.: "Thank you, sir. Good morning."

COUPON

WESTERN TUBE CO., Kewanee, Ill.

Gentlemen:—

Please send me full information and booklet about your Wrought Tube Radiators. Very truly,

Name_____

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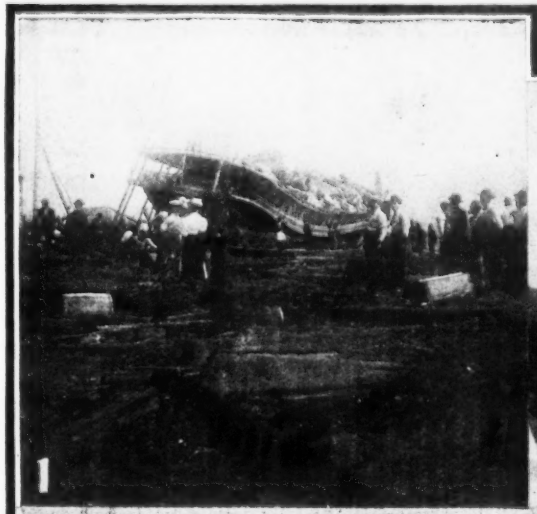
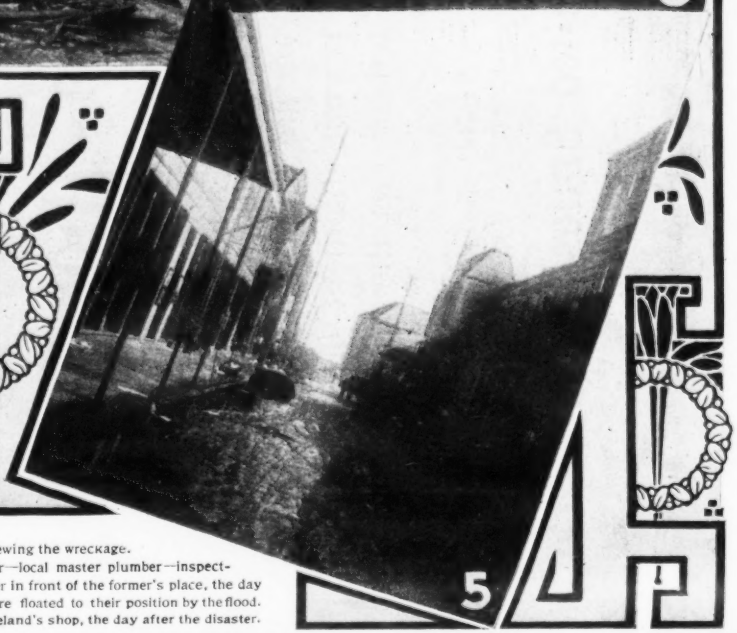
THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

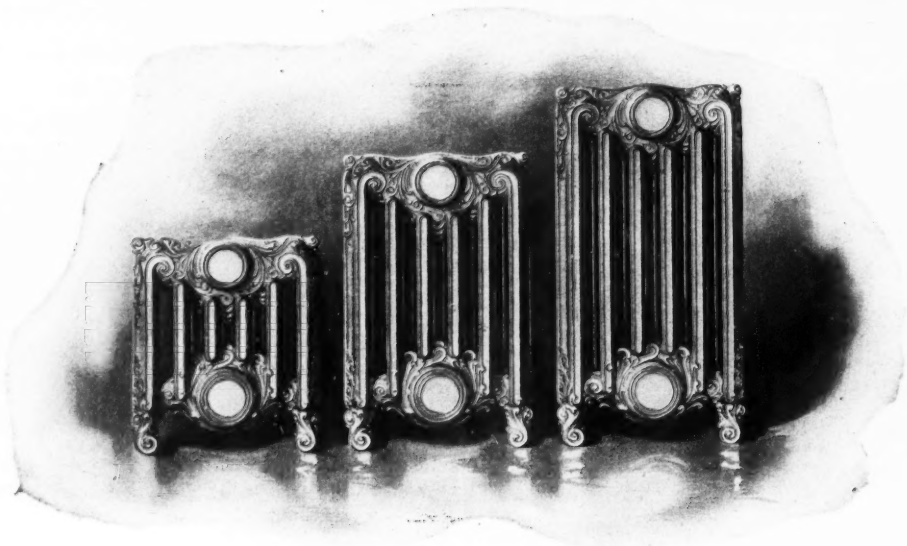
The Mobile (Ala.) Disaster





1 A group of master plumbers viewing the wreckage.
2 Morning after the cyclone. **3** Walter Potter—local master plumber—inspecting the debris. **4** S. D. Copeland and Walter Potter in front of the former's place, the day after the cyclone. The bales of cotton in the picture floated to their position by the flood. **5** Looking down St. Michael Street from S. D. Copeland's shop, the day after the disaster.

Use Sunray Heaters with Roman and Utility Radiators



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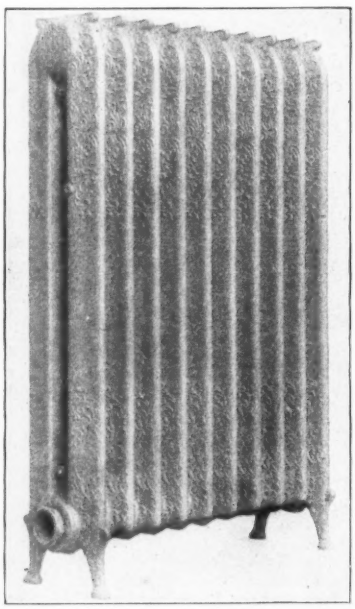

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Branches: New York Washington Chicago Minneapolis

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

DOMESTIC ENGINEERING

PLUMBING HEATING LIGHTING MILL SUPPLIES

Weekly: $1 a Year. Chicago, Saturday, APRIL 6, 1907. Whole No. 747. Vol. XXXIX. No. 1.

A man should learn to detect and watch that gleam of light which flashes across his mind from within, more than the lustre of the firmament of bards and sages. Emerson.

Temperatures for Testing Indirect Heating Systems*

BY W. W. MACON

(Concluded.)

In the foregoing it is assumed as stated that the system is designed on the basis of having the indirect radiator in zero weather at a certain temperature and obtaining the heated air at a certain temperature. If such a practice is not followed, it can be assumed that the engineer knows from experience with other of his systems that with a definite steam pressure or water temperature the air is usually delivered at a certain temperature. Though he may lay out a system without reference to the flue temperature a knowledge of its ordinary value assists in determining a proper test temperature.

ON THE DESIGN OF INDIRECT SYSTEMS.

An interesting point brought out by the charts is the high room temperatures that result in moderate weather with apparatus designed to give low flue temperatures in zero weather. For example, as noted on the chart for the hot water radiator at 180 degrees, higher room temperatures are indicated if the air is heated to 110 degrees in zero weather than if it is heated to 130 degrees. This means that when a system is designed to heat a specific building with 110 degrees flue temperature as against one with 130 degrees flue temperature a greater volume of air must be supplied in order to do the work, as the range of temperature that the air can be cooled to 70 degrees in zero weather is less in the case of 110 degrees than in the case of 130. In other words ventilation is secured in a greater ratio with a flue temperature at 110 degrees than with the flue temperature at 130, and greater ventilation means the escape of a greater amount of air, all of which has been heated from zero to 70 degrees. This is repeating what has already been said, that a given indirect radiator that heats the air to 110 degrees as against 130 is having the air passed over it at a higher rate of speed and is giving up a greater amount of heat per unit of surface than when the temperature of 130 degrees is obtained. While the increase in temperature is not so great the volume of air is that much greater, so that the total amount of heat, as represented by the weight of air multiplied by the range of temperature, is greater than that with the less amount of air heated through the greater range of temperature.

This relates to a matter of indirect radiation that is perhaps altogether too little understood, and that is the desirability of designing such systems on the basis of flue temperatures. It is commonly assumed that because one flue goes to the third story and another goes to the first the velocity in the higher flue, being greater, will bring about a greater amount of heat transmission from the indirect radiator. If the radiator, however, is of proper depth it will be able to raise the air in zero weather to say 150 degrees without regard to the height of the flue. The amount of air to heat the given room when delivered into the room at 150 degrees determines the amount of heat required and therefore determines the size of the indirect radiator. Increasing the size of the radiator simply increases also in proportion the free area of cross section for the air passage so that the actual velocity of the air over the radiator is not increased, but is kept constant. The fact that the velocity is greater the higher the flue simply makes it possible to reduce the area of that flue according

*Read at the thirteenth annual meeting of the American Society of Heating and Ventilating Engineers, held in New York City, January 22-24, 1907.

to the height of the flue and according to the amount of air that the flue must deliver.

The value of designing on this basis was recently explained at length in *The Metal Worker* by Mr. E. T. Child, in an article which gave charts and tables to show how to determine the sizes of radiation and flues for indirect heating with both steam and hot water. Mention is made at this length because of the widely varying and empirical methods of laying out indirect radiation, which methods are all right so far as ordinary or average systems go, but which are apt to fail when the unusual plant is to be designed. It is probable that the methods advocated by Mr. Child are those in use among some heating engineers, but they have seen fit to keep the information largely to themselves or have never been asked for it.

RULE FOR FINDING THE TEMPERATURES.

A rule instead of the charts can be used for finding the room temperatures and is as follows:

Multiply the outside temperature in degrees Fahrenheit by a factor given in the following list and add 70 to the product, when the sum will give the room temperature which should be reached by the system. The factors are given for different temperatures in the indirect radiator and for different temperatures in the flue on the zero weather basis:

	Factor.
For steam at 5 lb.:	
Flue in zero weather at 150 degrees	0.63
Flue in zero weather at 130 degrees	0.66
Flue in zero weather at 110 degrees	0.69
For steam at 2 lb.:	
Flue in zero weather at 150 degrees	0.63
Flue in zero weather at 130 degrees	0.65
Flue in zero weather at 110 degrees	0.68
Flue in zero weather at 90 degrees	0.72
For steam at atmospheric pressure:	
Flue in zero weather at 130 degrees	0.65
Flue in zero weather at 110 degrees	0.67
Flue in zero weather at 90 degrees	0.71
For water at 200 degrees:	
Flue in zero weather at 130 degrees	0.61
Flue in zero weather at 110 degrees	0.66
Flue in zero weather at 90 degrees	0.70
For water at 180 degrees:	
Flue in zero weather at 130 degrees	0.58
Flue in zero weather at 110 degrees	0.61
Flue in zero weather at 90 degrees	0.66
For water at 160 degrees:	
Flue in zero weather at 110 degrees	0.56
Flue in zero weather at 90 degrees	0.62

For an example, suppose it is desired to know the temperature of the room if the system has been designed to operate in zero weather at a water temperature of 190 degrees and under these conditions the flue temperature is found to average 125 degrees. For water at 200 degrees, the factors are 0.61 and 0.66 for 130 and 110 degrees flue temperature respectively, so that for 125 degrees flue temperature the probable factor is about 0.62. For water at 180 degrees, the corresponding factors are 0.58 and 0.61, so that for 125 degrees flue temperature the factor is about 0.59. For water at 190 degrees the factor is the mean of 0.62 and 0.59, or about 0.605. If the outside temperature is 27 degrees the inside temperature corresponding is $70 + 0.605 \times 27 = 86.3$ degrees. The same result can be obtained quicker by use of the charts.

HOW THE FIGURES WERE OBTAINED.

In the calculations by which the temperature values were determined the following symbols have been employed:

U = B.t.u. per sq. ft. of indirect radiator per hour per degree difference between the temperature inside and outside the radiator, for velocity which obtains in zero weather.

r = ratio or coefficient to take into account the variation of the value of U for different velocities, so that

rU = B.t.u. per sq. ft. per hour per degree difference of temperature for a given velocity.

R = the number of sq. ft. of radiation.

H = the B.t.u. per sq. ft. of radiation per hour.

RH = the total amount of heat given off by the indirect radiator.

v = the velocity of the air in the flue in feet per minute.

F = the area of the flue in square feet.

f = the friction factor by which the theoretical velocity is multiplied to get the actual, which is thus fv.

Q = the volume of air per hour in cubic feet.

w = the weight of the air at the temperature of the air outdoors multiplied by the specific heat of air.

t = the outside temperature (degrees Fahrenheit).

T = the temperature of the air in the flue.

T^1 = the temperature of the steam or hot water in the radiator, as the case may be.

h = height of the heated flue in feet.

As the amount of heat that a radiator will give off per degree difference must be multiplied by the difference between the temperature of the radiator and the mean temperature of the air passing over it,

$$H = rU\left(T^1 - \frac{T + t}{2}\right),$$

and the total heat given off is as follows:

$$RH = R_r U\left[\frac{2\,T^1 - (T + t)}{2}\right] \qquad (1)$$

The heat given off by indirect radiator is utilized in warming Q cubic feet of air through temperature range of $T - t$, so that

$$RH = w\,Q\,(T - t).$$

As Q is equal to vF, and as the velocity in the flue is

$$v = f\sqrt{\frac{h\,(T-t)}{460+t}},$$

the total heat absorbed by the air is as follows:

$$RH = w\,f\,F\,(T-t)\sqrt{\frac{h\,(T-t)}{460+t}} \qquad (2)$$

The total heat given off by the radiator is taken up by the air passing over it, so that equating the two expressions (1) and (2) the following equation is obtained:

$$\frac{RrU}{2}\,[2T^1-(T+t)] = wfF\,(T-t)\sqrt{\frac{h\,(T-t)}{460+t}}$$

For the conditions which obtain at zero the equation is naturally similar, and is as follows:

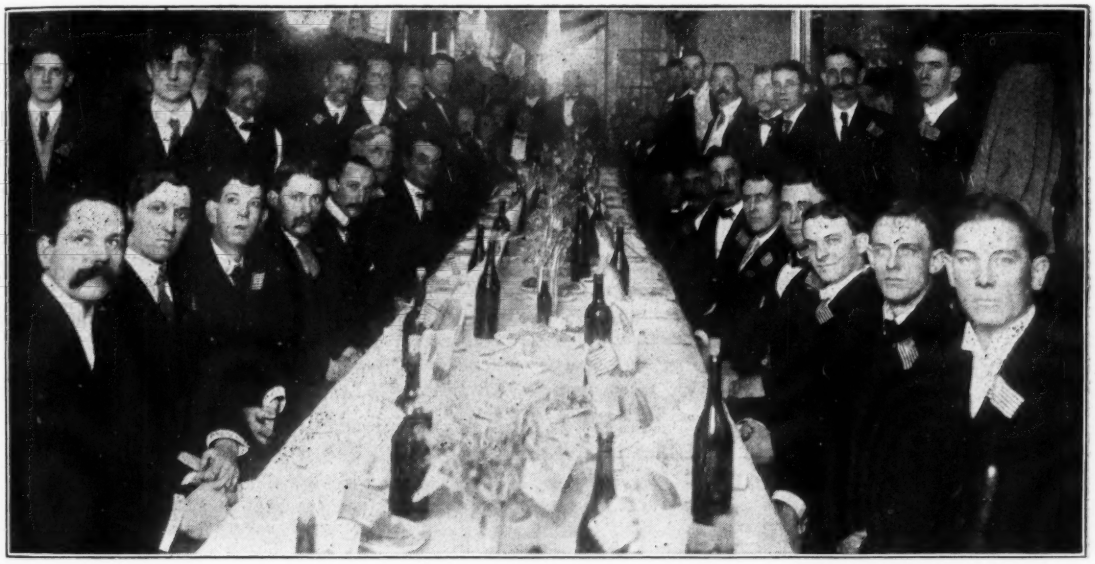
$$\frac{RU}{2}\,[2T^1-T(T_0+t_0)] = w_0\,fF\,(T_0-t_0)\sqrt{\frac{h\,(T_0-t_0)}{460+t_0}}$$

If the corresponding terms of the first equation are divided by the second, the equation takes the form of

$$\frac{r\,[2\,T^1-(T+t)\,]}{2T^1-(T_0+t_0)} = \frac{w\,(T-t)}{w_0\,(T_0-t_0)}\sqrt{\frac{(T-t)\,(460+t_0)}{(T_0-t_0)\,(460+t)}}$$

It will be seen that if it is assumed that the heat from an indirect radiator is not all taken up by the air, but that a loss of say 5 per cent is occasioned through radiation into the cellar, and so on, any factor allowing for this loss would be eliminated in the division so far as the last equation is concerned. It will be seen also that the same coefficient for the loss of velocity by friction is employed in the zero weather conditions as in the other conditions. It can be shown that the loss by friction is a constant or at least a practically constant factor of the theoretical velocity.

The last equation takes the following form:



Members of Louisiana State Association of Master Plumbers in attendance at their annual banquet, held at New Orleans on February 9, 1907.

$$T^3 - (3t + C)\,T^2 + [3t^2 + C\,(4T^1 - 2t] = C\,[4T^1\,(T^1 - t) + t^2] + t^3, \quad . \quad . \quad . \quad . \quad (3)$$

in which C is equal to

$$\frac{460 + t}{A},$$

in which A is equal to the following expression:

$$\frac{2T^1-(T_0+t_0)}{T_0 - t_0} + \frac{w}{rw_0}\sqrt{\frac{460 + t_0}{T_0-t_0}}$$

It is from equation (3) that the values of the flue temperatures were obtained. It will be noted that expression A contains the factor r and the factor $w \div w_0$. Assuming both of these factors equal to unity, trial values of the flue temperature were obtained, and from these the probable relative velocities ascertained. From a record of tests of the effect of velocities on indirect radiation, as given in Prof. R. C. Carpenter's book on "Heating and Ventilating Buildings," an approximate value of r

was obtained in terms of the outside temperature as follows:

$$r = 1 - 0.0015\,t.$$

In a similar way from tables giving the weight of air at different temperatures, the values of the ratio $w \div w_0$ were obtained, and this ratio, subsequently designated simply as w, was obtained also in terms of the outside temperature as follows:

$$w = 1 - 0.001\,t.$$

In the short time in which it was necessary to make the calculations of this paper the values of these ratios were employed for all cases, although, to be more strictly accurate, it would have been desirable to modify them slightly for the hot water radiation. The ultimate results would probably not be changed more than one or two degrees with 60 degrees temperature outdoors and of course much less at the outside temperatures present in any test.

A view of Thos. G. Knight, of Brooklyn, N. Y., cruising in the Indian River, Florida, just prior to an attack by a huge alligator.

The procedure in determining the temperatures was in brief as follows: For a given temperature of the heating medium, T^1, and for the given temperature of the flue temperature at zero, T, the value of A was first determined for the three temperatures of 20, 40 and 60 degrees, as shown in the sample calculation sheet included in the paper.

This and the rest of the work was done largely with the use of the slide rule. The hair line was placed opposite the value of A on the lower scale and the reading on the upper scale gives its square. Dividing this by means of the slide by $460+t$, which is 520, 500 and 480 in the three cases, a number is obtained which it is easy to take the reciprocal of on the slide rule, the reciprocal being the value of C. In substituting the value of C in equation (3) the equations noted on the calculation sheet are obtained. This gives an equation of one variable of the third degree, which expression, however, is not a perfect cube. It was therefore solved by a try method. A little practice would enable a close approximation to the probable value of T, and with the slide rule the value of the equation with this assumed value was easily obtained. If the first member of the equation with this assumed value gave a total which was greater than the second member of the equation, a value less than that first selected was taken and the first member again evaluated. Assuming that this showed a total somewhat less than the second member, by interpolation it was impossible to determine the value of T with one decimal point.

The determination of the value of inside temperature was in part as follows, with the use of the additional symbols:

t^1 = the temperature of the room air.

E = the equivalent glass surface, or better, the amount of heat that the walls and windows together will transmit for one degree difference in temperature between the room air and the air outside. Then the loss of heat by the air admitted into the room is

$$w\,Q\,(T - t^1).$$

This is equal to the loss of heat transmitted by the walls and windows, which loss is as follows:

$$E\,(t^1 - t),$$

then

$$wQ\,(T - t^1) = E\,(t^1 - t).$$

At zero degrees the equation is

$$w_0 Q_0\,(T_0 - 70) = E\,(70 - 0).$$

Dividing the members of the first equation by corresponding members of the second equation and simplifying the equation takes the form of

$$\frac{w}{w_0}\sqrt{\frac{T - t}{T_0 - t_0}} \times \frac{460 + t_0}{460 + t} \cdot \frac{T - t^1}{T_0 - 70} = \frac{t^1 - t}{70}$$

In this let

$$\frac{w}{w_0}\sqrt{\frac{T - t}{T_0 - t_0}} \times \frac{460 + t_0}{460 + t} = D,$$

so that the equation, solving for the room temperature, can take the form of

$$t^1 = \frac{70\,(D\,T - t) + T_0\,t}{T_0 + 70\,(D - 1)} \qquad (4)$$

The procedure in this case is the determination of D and simple substitution in equation (4).

Crusty—"What is this mayonnaise dressing?"

Nustin—"Goodness, man! How do you expect me to keep up with what women are wearing?"—Florida Times-Union.

The Common Sense of Sewage Pollution

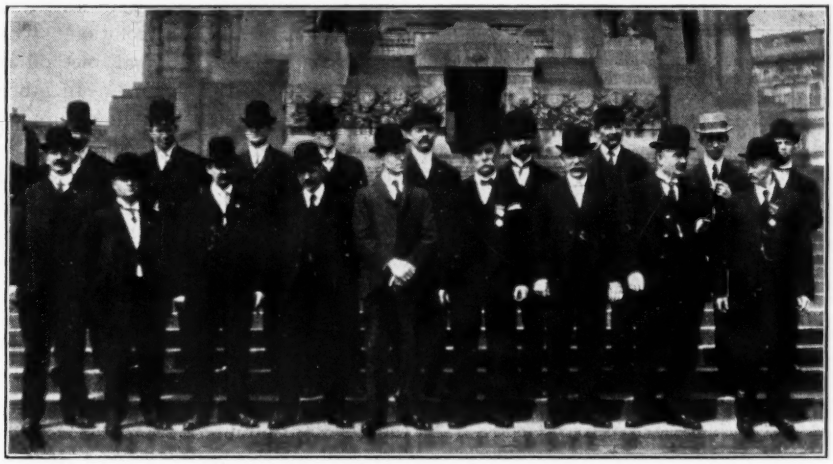
BY GEORGE ETHELBERT WALSH

The sanitary condition of the modern city is the keynote to the nation's health and happiness. Like the human system, which takes nourishment from its food and scientifically disposes of the waste or elaborates violent poisons to destroy it, the city of to-day either preserves its own health and sweetness by properly safeguarding all avenues of danger, or it breeds sickness and disease within its own border and spreads epidemics over the beautiful, fertile country which environs it. Further than this it may be said that it feeds the poisons which it manufactures to neighboring towns and cities which happen to be located along the same stream of water. As it grows in power and numbers its menace to the whole country increases until it may be aptly termed "a great poison factory."

The purity of municipal politics, and even the morality of its inhabitants, are after all of secondary importance to its health, for without cleanliness and health the escape from moral atrophy is practically an impossible achievement. So trite are such remarks that they seem needless except as an introduction to the discussion of a problem that is rapidly becoming of paramount importance in this country. The purity of our drinking water has been emphasized as fundamentally essential to health either for the individual or the nation, and the amount of attention devoted to this subject in recent years has tended to educate the public to a proper realization of its danger from such sources. Municipal engineering is rapidly eliminating typhoid and kindred fever-diseases from our cities through the construction of proper water works which insure to the inhabitants pure, uncontaminated drinking water. Tens of thousands of lives have been saved from premature death in the last ten years simply through the scientific filtration of drinking water and the removal of contaminating agencies from the vicinity of the water source.

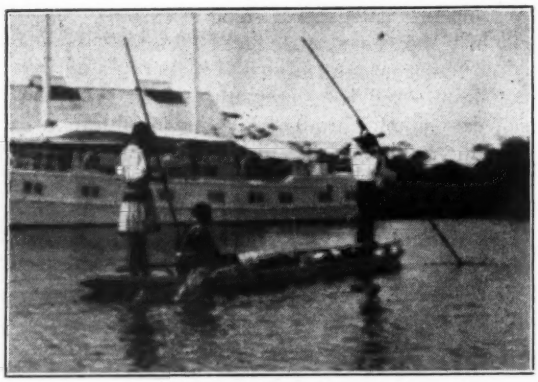
But an equal important problem as the drinking water of our cities is the proper disposal of sewage. This feature of our municipal life was hardly considered at all from a scientific point of view ten years ago. If a city was located on a river of considerable volume, the disposal of its sewage appeared simple. The city emptied its waste into the stream, and there was no danger from infection from its own sewage. Occasionally in very dry seasons the river's volume might grow so small that the sewage would become inimical to its health. But what of the cities and towns below whose water supply was drawn from the polluted river? That was considered a question that did not concern the former city. It was the duty of each to care for itself.

But this short-sighted policy has ceased, or is rapidly ceasing, to be generally accepted. Our towns and cities are interested in the health and prosperity of the whole state and nation. Anything that affects the health and prosperity of a



A group of delegates in attendance at the recent Indiana State Convention, held in Indianapolis, March 20-21. Photograph by our Mr. Winslow.

single town must in time react upon all other towns and cities. The pollution of our streams is a crime that is growing less prevalent, and one that should never have been tolerated at all. Even where cities



James Meeks, of Brooklyn, N. Y., rushing to the aid of Thos. G. Knight, who had just captized from his canoe, during his recent sojourn in Forida.

are supplied with scientifically-constructed water works and filtration plants, the danger from polluted streams is still present. The spread of typhoid by clams, oysters and fish which feed at the mouth of distant polluted streams is a question that concerns every one. No man or woman who eats oysters and clams is sure they are free from poisonous germs that may cause death. Immunity from such sources of infection can be attained only when the scientific disposal of sewage is properly regulated by law, and any other distribution is punishable by heavy fines and imprisonment.

The proper disposal of city sewage is still in the transition stage, and, properly speaking, in the experimental stage. In almost every country and state experiment stations are now maintained at both public and private expense for the purpose of working out the most satisfactory solution to the problem. Nevertheless, engineering science has reached a point where it is no longer necessary for one city to poison another with its polluted water or to generate within its own corporate limits a poison factory for self destruction. It is more a question of economics than of sanitation that induces municipal engineers to experiment with different sewage systems.

The pioneers in experimenting with bacteriological sewage purification were the Massachusetts State Board of Health in this country, Warrington and Frankland in England, and Scholoesing and Muntz in France. They made their earliest attempts to solve the problems some twenty years ago, and since then the necessity of sewage purification has grown so imperative that State Boards of Health in all parts of the country are studying the subject. The theory of the pioneers was that the contamination of water supplies must continue until there could be found some better way to dispose of the sewage than to empty it into streams, and it is quite evident that the contamination of water supplies has increased enormously in the past five and ten years.

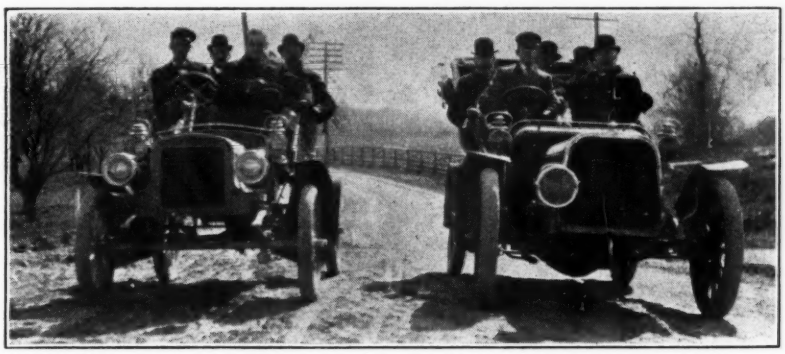
Sewage filters have been invented which convert the most foul and turbid sewage into clear, sparkling water, and after such purification the water can pass harmlessly into any river or brook. In the early experiments both mechanical and chemical systems of doing this were tried, but they failed because they could not dispose of all the large quantities of impurities held in solution. To-day neither the mechanical or chemical method is depended upon, but the bacteriological. In other words engineers have sought to imitate nature in her disposal of the great waste scattered around. The leaves and foliage of the woods of each season when they fall from the trees must be disposed of in some way. This is performed by a process of combustion or oxidation. In the sewage a similar process can be made to take place if the right conditions are provided. In the sewage bacteria are found which purify the waste by breaking up the animal and vegetable matter into their harmless constituents.

Modern bacteriologists have sought to ascertain the relative number of bacteria found in sewage. The bulk of the latter in large cities is enormous, and to purify it a host of bacteria must be employed that is simply phenomenal. This host of beneficial bacteria varies greatly in sewage, but in some examples tested as many as 100,000,000 to 120,000,000 of them have been found in a single gramme of sewage. This is the enormous army which makes it possible for municipal engineers to purify the sewage of our cities and promise future generations perfect immunity from contamination from such sources. Moreover, this army of beneficial workers under favorable conditions multiply at the rate of some 16,000,000 in each twenty-four hours from a single bacterium.

Disposition of Sewage on Land.

The chief question for serious consideration in the treatment of the sewage is, therefore, how best to arrange conditions so that the bacteria can do their work in the most effective way. One of the oldest methods used for economical disposition of

sewage is by spreading it out over farming land. This land treatment method has been a success in many parts of England, at Berlin, Germany, and in some parts of this country. Near Berlin upward of 19,000 acres of land are fertilized by the sewage after it has been purified by the action of the bacteria. Convicts attend to the farming, and in some years the returns from the farms pay for all the expenses of administration and maintenance. The amount of the land required for sewage treatment is so great that this system can never be made successful near cities of the first class, but for cities with populations varying from 15,000 to 100,000 inhabitants it is possible to use it with very satisfactory results.



"A Breezy Delegation." This is a view of prominent officers during an enjoyable auto ride at the recent Indiana State Convention. Photograph by our Mr. Winslow.

In this country Pasadena, California, claims to have solved the sewage problem by this land treatment. In its early development, the city disposed of its sewage in cesspools, but this was considered unsanitary as the population increased and measures were taken to adopt some other method. It was practically impossible to convey the sewage to the ocean in pipes some thirty miles away. The present plan of disposing of the sewage by the land treatment was opposed strenuously by most of the city's population, and it took several years to overcome popular prejudice.

However, the plan was finally carried into effect. Fifty miles of sewer piping were laid, with 650 manholes, and 140 flush tanks, at a cost of $313,000 odd dollars. A sewer farm of 300 acres about five miles from Pasadena was purchased at a cost of $37,500. The sewage from the city pipes is carried to this farm through a vitrified clay pipe, twenty-two inches in diameter, and with a fall of about one foot to the mile. This outfall pipe is placed five feet below the surface, and as the slope of the land from the city to the sewer farm is rather sharp the incline of the pipe is sufficient to keep it open without flushing at intervals by rain. This fact had to be considered in building the sewage works of the city as there is no rain from May to November, and the ordinary flushing from the natural flow of water could not be depended upon.

The sewage passes from the outfall pipe into irrigating ditches, which owing to the slope of the land and their scientific construction distribute the water and sewage uniformly over the three hundred acres. About seventy-five per cent of the sewage is water and only twenty-five per cent solid material. Deep irrigation and deep cultivation are carried on with scientific accuracy on the sewer farm, and the soil is fertilized to a degree that makes it highly profitable. It is continually worked over and planted with new crops, and just as many crops can be raised a year as the land will support. Crops of all kinds have proved rapid growers on this farm. Some ninety acres of the land are planted with English walnut trees, and from $7,000 to $8,000 worth of nuts are sold annually from the grove. The cost of cultivation is so slight that this represents almost net profit. Some twenty acres of the farm are planted with pumpkins which are raised to feed to hogs and stock. The largest pumpkins ever raised in California have been obtained from this farm. Over one hundred acres are devoted to the cultivation of barley, which furnishes hay for the stock and for market. Two crops are raised a year on the farm. The rest of the land is given over to corn and other fruits and vegetables.

The secret of the success of the farm is simple. The sewage keeps the soil not only highly fertilized at all times, but well moistened, and through the

long dry seasons crops can be raised on the farm which would not thrive elsewhere. The distribution of the sewage is under control of the farmer who can regulate it to suit any part of the land, and "sewage sick" soil is thus prevented. The sewage exposed to the atmosphere in passing over the soil is quickly purified by millions of bacteria, and the land instead of being soured or contaminated is sweetened and enriched. It is like the simple process of decomposition of leaves and foliage in the heart of the forests. The hot sun acts as a deodorizer so that there is no unpleasant odor in any part of the farm. So far there has been no trace of illness due to the sewage disposition at the farm, and the health of Pasadena has been improved ever since the present system was adopted.

(To be continued in the issue of April 20.)

Air, and Its Relation to Vital Energy

BY S. H. WOODBRIDGE

Professor in Massachusetts Institute of Technology

CHAPTER I.

The Body an Energy Transformer.

EXISTING energy a product of the transformation of pre-existing energy. All physical phenomena are changes in matter accompanying the transformation of energy from one form into the same energy in another form or forms, or the change of energy in the same form from one body, or aggregation of matter, to another. All work consists in change in the form or forms of energy. The so-called developed energy, by which are carried on the industries and processes in which human activities are engaged, is pre-existing energy, in altered form, or manifestation. Thus, the energy of steam is part of that which pre-existed in the chemical energy residing in the chemical affinities between the atoms of carbon and hydrogen on the one side and of oxygen on the other. In the phenomena known as combustion, chemical energy is transformed into thermal energy. The energy in the produced steam is part of that thermal energy transmitted from the combustion gases to the water molecules, the remainder being unutilized, passing off with the hot gases which escape through the chimney, and in the heat otherwise lost.

The great source of energy within human reach and ready to man's use is that of the character just described. On one side is carbon and hydrogen in their various forms and combinations, and on the other side is the oxygen abundantly furnished in the atmosphere. Carbon has been stored in enormous quantities within easy reach. The oxygen of the air is so diluted by a neutral gas that the rate of chemical energy transformation and reappearance in thermal form is within man's control. The nitrogen of the air makes it possible for but one out of five of the atmospheric molecules which approach the carbon to combine with its atoms. Beside acting as an effective buffer, these neutral molecules of nitrogen share the produced thermal energy which is the product of chemical combination between the oxygen and the carbon, and so greatly reduce the rate of chemical action between the two combining elements. If the atmosphere were without the effect of the nitrogen buffer and cooler, combustion would become uncontrollable, and material which now burns slowly and controllably would ignite with the rapidity of flashing gunpowder. The presence of nitrogen in the existing proportion does not, however, fix the combustion rate, since by means of draught the quantities of air and of oxygen brought into contact with material in a state of combustion may be increased and controlled at will and the intensity of combustion correspondingly regulated.

THE PHYSICAL FUNCTION OF THE BODY.

The human body is essentially an organism for the transformation of chemical into other forms of energy. It is a complex mechanism, a system in which and by which already existing energy is transformed into what may be called vital energy, the transformation being through chemical or vitochemical processes. The source of the body's energy is largely in the chemical energy which exists between carbon and oxygen, and perhaps also that which exists between hydrogen and oxygen. The human body is furnished with means for oxidation processes and with associated mechanism, and mechanically considered it is like the boiler of a factory and its associated engine, shafting, belting, gearing, machines, and tools. It is the most perfect type of energy transforming and using means known. In the mill the energy is produced at a central point, in the fires beneath the boilers, often and generally remote from the place of its application in productive expenditure. Between the point of production and the place of application are the water, steam, pipes, engine, belts or gearing, shafting, and finally, the special machines or tools. At every point of change energy is wasted. But little if any more than one-half the thermal energy developed by the oxidation process is stored in the steam. The engine which requires 35 lbs. of steam

per hour to develop one horsepower in dynamic energy uses nearly 30,000 thermal units out of the 60,000 or more thermal units developed by the coal combustion. The thermal equivalent of one horsepower per hour work is but 2,545 thermal units, whereas the thermal units in the 35 lbs. of steam furnished the engine is nearly 30,000. Under the conditions assumed not more than 1-13 of the thermal and elastic energy residing in the steam is transformed into energy of the engine action. Between the energy produced in the fire and that available in the engine there is a ratio of 26 in the fire to 1 in the engine. Beyond the engine the loss is continued in the action of belts, pulleys, gearings, bearings, frictions, and resistances of one kind and another, to such an extent that the effective energy output may not exceed 1-50 of that produced in the fires.

"In a Florida Grove." This is a view taken by E. E. Haff, of F. N. Du Bois & Co., New York City, during his recent sojourn in that section. From left to right in the picture are: Thos. G. Knight and Chester Gleason, of Brooklyn; A. B. Haff, of Amityville, L. I.; Captain Jackson, Charles Coombs and James Meeks, also of Brooklyn.

Contrast Between Mechanical and Vital Systems.

In comparison with the mill system for the transformation, transmission, and expenditure of energy in productive work, the human body, and other animal systems, stand in marked contrast. In the latter energy is developed at or near the point of its expenditure, and the losses due to transmission through long distances and the changing forms of mechanism are for the most part avoided. Thus, if work is done by the hand, the energy therefor is largely "generated" by the oxidation of carbon in the muscles of the forearm and hand. The mode is ideal in respect to the economy of energy transformation and application, and the nearer it may be approached in the design and operation of mills and other mechanisms, the greater the efficiency of developed energy becomes.

Whenever and in whatever manner a given quantity of fuel is oxidized, whether with the intense ignition common in the boiler furnaces, or with the slow oxidation peculiar to the body's fires, the same quantity of thermal energy is produced and the same products of combustion are evolved. To both processes oxygen on the one hand and carbon or hydrogen, or both, on the other, are essential.

Anology Between the Requirements of Mechanical and Vital Systems.

The analogy between the power, or mill, system and the animal system extends beyond the methods of energy production and expenditure. On the one side are furnaces, boiler and associated parts, and on the other the body with its digestive, respiratory, and motor organisms. For the mechanical system are required fuel and draft; for the vital system food and air supply; the purpose of the latter is in both cases to supply oxygen and to carry away combustion products.

The essentials to a good boiler fire are practically the same as those to a good working vitality. The first essential to a power system is draught; the second, proper stoking. The first essential to a

working vitality is air, and, second, proper exercise. The third essential to a power system is good fuel, and to vital energy, proper food.

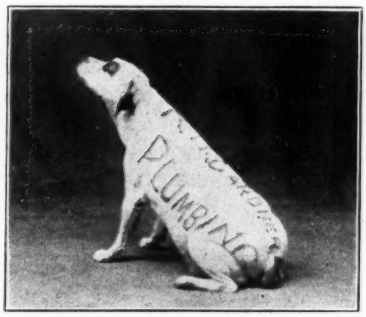
Of these essentials the most important to both the power and the animal systems is air. The best of fuel and the best of stoking are of no avail without draught. A hot fire may be made out of poor fuel, provided the draught is good and the stoking skillful. So also the best of food is useless without breath.

Next in importance to the power and the animal systems are good stoking and proper exercise. The best of fuel, however good the draught, with poor stoking, furnishes only poor results in heating power and evaporation rates. Good stoking with poor fuel and good draught may give fair results. What in these matters is true of boiler fires is also true of the body. Air quality is of more importance to energy production than is food quality. The vital energy of the man who lives on inferior and ill served food, but who exercises freely in out-of-door air, excels in a marked degree that of the man whose food is of the best but whose habits are sedative.

So, also, proper exercise is of greater importance than is food quality. These facts are illustrated in the superb physique and the superior strength of the out-of-door laborer whose diet would be disdained by the dainty lounger as that he would not bring himself to touch until close to starvation. The one has coarse, perhaps ill adapted and ill prepared food, but an abundance of pure air and exercise. The other has the choicest of foods wholesomely prepared, but breathes the tainted air of enclosures and exercises effortlessly and without stirring the body's fires into a continuous glow. The first essential to vital energy is therefore air. The function of ventilation is to supply that air, and, within certain fixed limits, to keep indoor air as pure as out-of-door air.

Products.

The analogy between the power system and the animal system includes also the products attending the process of energy transformation, or otherwise, the process of oxidation. In the furnace, the principal product of combustion is carbon dioxide. Accompanying this is the formation or liberation of a considerable quantity of water vapor. There are also products of incomplete oxidation, such as smoke, carbon monoxide, and traces of other gases or vapors. Heat, also, not taken from the combustion gases or fire by the boiler escapes unused. For these waste products is provided a chimney, whose function, beyond that of supplying air to the fire, is to remove the combustion products of the fire. Other products attending combustion are in the soluble and the insoluble ash, for which is provided the pit.



"Duff Earning His Bones and Dog Tax." This is a novel form of advertising employed by R. H. Gardner, of Columbus, Ind.

On the side of the animal furnace, there are found essentially the same products attending the process of oxidation within the body. From it, carbon dioxide is the principal gaseous elimination. Water vapor escapes also in considerable quantity. As in the case of the power boiler, this vapor is not that generated within the body, but rather that supplied to it, like the evaporated moisture of fuels, or the greater quantities passed off from the boiler plant through the exhaust of engines. From the body there is also a more or less continuous elimination of effluvia, a waste product which is allied to the smoke of the boiler plant. It is oxidizable matter passing off in a state of incomplete oxidation. There is also eliminated from the body heat untransformed into work, and unusable. In the case of the power plant, but a small part of the heat developed in the furnaces is converted into mechanical work. So it is also in the case of the body.

For the eliminations from the body thus far mentioned ventilation is provided, as is the chimney for the corresponding waste products of the power plant. The function of ventilation is to furnish air for the purposes of oxidation, and also to remove the products of or accompanying the oxidation effected by that air supply. Finally, there are the soluble and insoluble wastes of the body in the form of excreta, and these correspond to the ash of the boiler plant. The excreta are disposed of by drainage, as the boiler ash is provided for in the pit, and by mechanical removal.

Boiler and Power Plant			Body		
Requisites	Fuel		Food		
	Stoking		Exercise		
	Air supply	Chimney	Air supply	Ventilation	
Wastes	Carbon dioxide		Carbon dioxide		
	Water vapor		Water vapor		
	Smoke		Effluvia		
	Heat		Heat		
	Ash, pit and carriage		Excreta, closet and drainage		

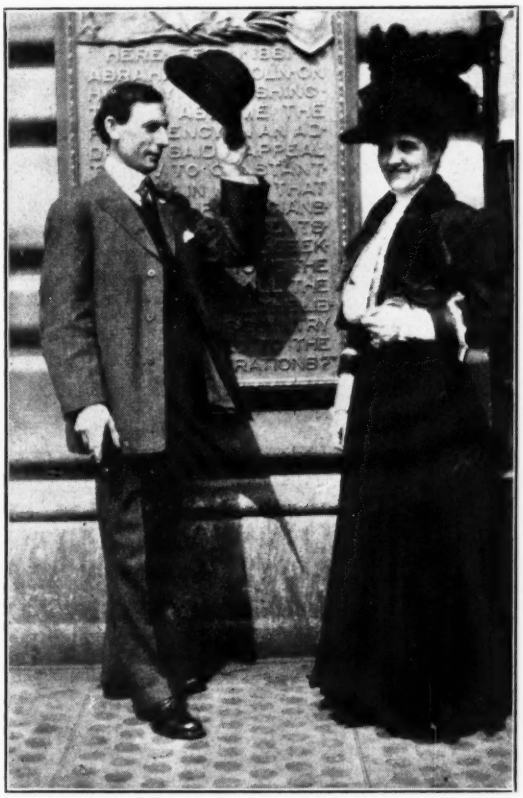
CONDITIONS AFFECTING THE RATE OF THE PRODUCTION OF WASTE—WORK.

The rate of waste production attending oxidation as a process of energy transformation available for work varies with circumstances, and first of all with the rate of the work done by the mill or the vital system. As the fuel burned under the mill boiler varies with the work done by the mill engine, so the rate of oxidation within the body varies with the work done in and by the body. Such work may be internal or external, or both, and either physical, mental, or emotional. Mental work is effected by an expenditure of energy as truly as is physical. When any work is done requiring a special mental effort, this fact is made sufficiently evident in food required, in temperature produced, in carbon dioxide, vapor and heat eliminations. Mental activity is accompanied with an appetite for food; intense mental work results in a development of heat which is quickly felt in the temperature of the body and in the comfortableness of cooler air or thinner clothing. The student listening passively to lecture and discussion is doing less work than one struggling over a difficult problem or an examination paper. He requires for the harder exercise cooler air and cooler surroundings than for the former less energetic work. It is evident, therefore, that the state of mental exercise of occupants affects the temperature requirements of an enclosure, and also the ventilation requirements. The analogy between the boiler and the animal system is in this matter evident, since both alike require increase of air with increase of work.

The carbon oxidized within the body of an adult in a state of repose or moderate activity varies from 2 to 3 grains per minute. Work, from light to hard, increases this rate from 2 or 3 to 5 or more times that amount.

TEMPERATURE.

The second cause affecting the rate of carbon oxidation within the body is found in the atmospheric and other temperatures about it. As has been already noted, but a fractional part of the heat developed within the boiler furnace is transformed into external work. Heat is necessary to sustain the boiler functions in the providing for draught, in the making and maintaining of steam in advance of pressure production, and so forth. In a similar manner, heat is necessary to sustain the vital functions of the body. The body's temperature must be maintained at a nearly fixed point, otherwise the entire vital system is exposed to collapse. The greater the temperature difference between the body and its surroundings, the greater the heat loss; and the greater the heat, and therefore the fuel, requirement; and the greater the amount of carbon oxidized. Hence, the greater winter than summer appetite, and the greater the craving for food rich in fats and hydrocarbon in cold than in warm weather.



"A Gentleman of Indiana." R. H. Gardner, of Columbus, Ind., accidentally meets his wife during the recent Indiana State Convention. Photograph by our Mr. Winslow.

WEIGHT.

The third cause affecting the rate of oxidation is the size of the system in which the oxidation takes place. The more ponderous the machinery the greater the energy required to operate it, even though it does no external work. Also, the large-

the cooling surface the greater the rate of cooling, and the more oxidation required to maintain the functionary temperature of the body. This is true of both engine and of animal systems.

It has been experimentally found that the volume quantity of carbonic acid gas eliminated from the human and the brute body bears a certain fixed relation to the weight of the body, whether human or brute. That elimination is 0.00424 cubic feet per hour per pound weight for a state of inaction. The increase due to action or work is found to be approximately 0.00211 for each unit of work equal to a mile walk per hour on level ground. The total elimination, therefore, may be expressed by

$$W\ (0.00424+0.00211\ n),$$

in which n represents the work equivalent in miles walked per hour, and W the weight of the body. From these data it would appear that the hourly elimination from an individual at rest and weighing 150 lbs. would be 0.63+ cubic foot per hour. The average for a mixed audience of adults is generally assumed to be 0.6 cubic foot per hour. For a horse weighing 1,100 pounds the quantity would be between 4 and 5 cubic feet per hour. There is to be added, for conditions of exercise, a quantity represented by .00211 n, the "n" indicating the unit of exercise already defined. A consideration of these formulæ and figures makes it evident that the quantity of air required by youths and adults, whether in repose or engaged in work, is greater than for the same number of children, each weighing less than 100 pounds, in similar repose or exercise.

These figures furnish the data for computing the air quantity required for the ventilation of any occupied enclosures. Let it be required to furnish ventilation for a stable containing 50 head of cattle, the cattle weighing 900 pounds per head, and the limit of variation from the outside air being 4 parts in 10,000 carbonic acid gas. The produced per capita carbonic acid gas is $0.00424\times900=3.816$. This quantity is to be diluted to 4-10,000; therefore $3.816 \div .0004=9540$=the number of per capita cubic feet of air to be supplied per hour. This quantity multiplied by 50 gives 477,000 as the total per hour supply required for the ventilation of the stalls.

Exterior view of plumbing establishment of C. P. Sullivan at Highland Park, Ill. Mr. Sullivan will be noticed in the door-way.

Age.

Age affects the rate of carbon dioxide formation in the body. There are three principal ages which affect type and rate of activity. One is that of the continuous and irrepressible activity peculiar to children. At this period the activity is such that the per pound and per hour carbon oxidation is greater than for maturer years, when activities are of a more quiet character. During the period of decline energies flag, and the per pound and per

hour rate of oxidation is still further reduced. Because of the rapid growth of the child and the greater delicacy of its vitality, and its greater need of the best hygienic environment, the quantity of air furnished should be larger than would be indicated by weight, or even by carbon dioxide elimination. Because of special susceptibility to harmful conditions, and also because of the greater per pound and per hour oxidation, the quantity of air furnished in ventilation for children and youths should be not greatly less than that furnished to those of adult age.

The effect of sex upon the rate of carbon dioxide elimination is chiefly that of size. Since the weight of the average male is in excess of the average female, it follows that the average quantity of carbon dioxide elimination is greater from the male than from the female.

Attractive premises occupied by Frank E. Butts at 6306 Lexington avenue, Chicago, Ill. The gentleman mentioned will be noticed in the center of the picture.

Water Vapor and Its Variable Rate of Elimination.

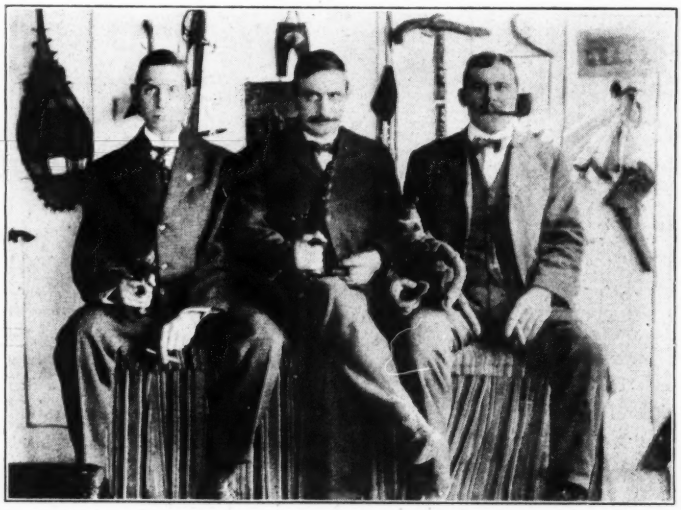
The elimination from the body of second importance, in point of quantity, is water vapor. This in a way corresponds with the exhaust steam thrown outboard from an engine. It carries away unused, because unusable, heat of the boiler and of vital fires. But a small part of the water vapor escaping from the mill boiler and engine combination has its origin in the fire. Some vapor escapes from the wet or damp fuel, and some is generated by the combustion of the hydrocarbons in the fuel. The larger part of the vapor escaping from a power plant is, however, that which has its origin in the boiler feed, namely, that which passes off from the engine. So it is also in the animal furnace and associated mechanism. By far the larger part of the moisture evaporated is that taken into the system in drink and in food. It is probable that some hydrogen, equalling perhaps 9 grains per hour, is oxidized within the body, and the water so formed is part of the vapor elimination. It is in the vapor elimination that a considerable part of the heat produced within the mill and the body disappears.

The heavier the work of the mill plant, the greater the rate of steam discharged. The analogy holds true of the vapor elimination from the body. Only a small portion of the heat produced within the body is transformed into external work. Therefore the greater the external work done, the larger the development and accretion of heat, and the more rapid must be its elimination. The excess of that elimination above the normal is principally through evaporation. The rate of vapor elimination from the body of an adult in a state of rest is approximately 1½ ounces per hour, and in a state of exercise may easily reach 3½ to 4 ounces.

Effluvia.

A third elimination from the body, while one of the least in quantity, is of the highest hygienic importance. The effluvia of the body is analogous to the smoke and imperfect combustion products of the mill furnace. It may be classified as unoxidized matter attending energy transformation within the body. The smoke, the non-oxidized or but partially oxidized carbon and hydrocarbon of the chimney's output is its analogy in the mill system. The smoke of the smokiest chimney bears but a small ratio to the total quantity of the coal burned in the boiler fires, the fuel so wasted seldom reaching 1 per cent of the fuel quantity used.

and apartments of servants' quarters. If the moisture contained in the air of a well filled and close room be condensed on cold window glass, and be kept for a sufficient time in a warm place, its offensiveness becomes pronounced. So, also, with free effluvia; it may be odorless when fresh, and may become foul by retention under proper conditions of temperature and humidity. This fact has an important bearing on the relation between the per capita cubic space and the quantity of air required for ventilating work. The larger the per capita space, the longer in general becomes the retention of the decomposable matter, and the more advanced the stage of its decomposition before dis-



"A Reign of Terror." Picture taken by our Mr. Winslow in the home of George C. Hutton, a prominent master plumber of Wilmington, Del. Reading from the left: A. T. Dyer, Philadelphia, manager of the Prizer-Painter Stove & Heater Co.; George C. Hutton, himself, and Robert Grier.

The effluvia eliminated from the body is proportionately small; but though, like smoke, minute in quantity, it is made offensively evident by its disagreeable presence. Effluvia is an unoxidized organic waste of the body. It is the body's dermal sewage. Its rate of elimination increases with that of the liquid movement or waste through the pores, by which it is carried to the surface. The normal quantity of the effluvial matter discharged from the body is probably not less than ½ nor greater than ¾ of a grain per hour. It is highly decomposable and quickly putrefies, and in this state is highly offensive, and for this reason alone, if for no other, is unwholesome. It is that which gives the foul odor peculiar to crowded and poorly ventilated rooms, and the odor characteristic of the clothing

charge. Hence, the larger the per capita space, the greater the per hour air quantity required to maintain the conditions of atmospheric sweetness or salubrity within an enclosure, the odor attending the presence of effluvia corresponding with the stage of its decomposition, and the stage of its decomposition corresponding with the time of its retention. Therefore, the air quantity required to produce equal effects as regards sensible odors arising from effluvia and its condition is, to a degree, proportional to the per capita space within an enclosure. As will be later shown, the temperature and humidity of air are important factors in determining the quantity of air required for maintaining an odorless and otherwise agreeable quality of air within enclosures.

HEAT.

Next in the named order of eliminations from the body is that which is the basis of dynamic and vital energy, namely, heat. This form of energy is developed in the body, as also in the boiler fires, by chemical processes. Thermal energy is developed within the body by every process through which chemical affinities between oxygen and carbon and oxygen and hydrogen are more nearly satisfied. The process is principally between carbon and oxygen, and only in small part between hydrogen and oxygen. The thermal energy developed by the transformation of chemical energy existing between one grain of carbon and the corresponding weight of oxygen entering into combination with it is 2.07 thermal units. When one grain of hydrogen unites chemically with its corresponding weight of oxygen, the thermal energy developed is 8.86 thermal units. The average amount of heat developed within the adult human body by the complete oxidation of carbon and hydrogen may be stated thus:

C. 135×2.07=279 the B. T. U. developed per hour.
H. 9×8.86= 79 the B. T. U. developed per hour.
Total, 358 the B. T. U. developed per hour.

(To be continued in the issue of April 20.)

Model Membership*

BY WM. WANNER, CINCINNATI, OHIO

Wm. Wanner, Cincinnati.

To whatever organization a man belongs, he should, to be consistent, carry out every obligation of membership he has assumed and perform every duty thereby laid upon him. The purpose of the organization should be fully understood and accepted, the full spirit of it, the protecting power of it, and the propagating idea of it should be earnestly felt and cherished. Only when its members realize this can an organization obtain its end and justify its existence. It should be understood that an organization is no better than its members—its constituent parts are its units. It is exactly what they are or choose to make it. Hence, it is exceedingly desirable that those who enter an organization, especially this, the National Association of Master Plumbers, should do so with right motives, not because someone else has seen fit to do so, not because they think it merely a good place for amusement, but because it is a good thing in itself, and that the association is a needed thing such as they would do well to promote. But it is the man himself who counts. To the unthinking, the self-seeking, or the sordid, this association may momentarily not seem attractive, but there is nothing in such people to answer to the high character, the protective principles or fraternal spirit of this association. Securing the right material, our association must necessarily become inspirer of thought, duty, character and service, because each adherent would know what the association is, they would have faith in its form and its purposes, they would give their heart and mind to it and labor faithfully for all its interests. Thus we affirm that knowledge, faith, enthusiasm and activity are the unmistakable characteristics of true membership, and everything moves upward without obstruction. Strife occasionally there may be, but not beyond what is simply inseparable from a natural conflict of opinions, and all subservient to the end ever kept in view, the true interest of the members, our association, the state and national. The model member seeks to know, he is anxious to find out all about it, its foundations, its principles, its teachings, purpose and spirit. He is willing to learn, even though it may result in changing or modifying preconceived opinions. By persistent inquiry he finds there is much in organization beyond what he thought or dreamed. He adds thought to thought and fact to fact, until he becomes not wise in his own conceit, but wise with the thought of others who labored patiently before him. Gaining thus an adequate knowledge, his eyes open to the wisdom of it all. He sees the organization as a needed helper to his financial interest, as an able instructor to his profession and as a cultivator of the harmonious feeling that should exist between his competitors. Faith then fills his mind with a spirit of earnest devotion. His better feeling and interest are nurtured and built up. Thus he becomes persuaded of the organization as a wise leader and needed helper; it is to him a true, uplifting moral force, such as the world, and especially the members of our profession, need in this age of intense struggle and hard driving commercial pursuits and selfish endeavor. The fire of enthusiasm is enkindled within him in behalf of a cause which he feels and knows to be for the good and welfare of himself and his fellow craftsmen, and "I serve" becomes henceforth his motto.

* Essay read at the twenty-fourth annual convention of the National Association of Master Plumbers, held at Atlantic City, N. J., in June, 1906.

If every one of us were impregnated with this thought of loyalty and service what a scene of transformation would come before us! It would fill our very souls with visions of glory, the brightened eye of interest and helping hand of protection would everywhere he seen and felt, and the chilling gloom of doubt would give place to the glowing fervor of reality; then would our associations make rapid and solid headway, gathering momentum as they advance. If our active and ceaseless service to our association shines in use there need be said nothing by way of commendating, for then it speaks for itself. Those who contribute to bring about such a condition will find in it the utmost pleasure and satisfaction, for he is the happiest and most satisfied member who contributed to it the greatest service. His devotion and loyalty to the organization and its principles are measured by what he does for it. He will "shine in use" to the extent of his service only, and if he does nothing, if he pause in his devotion to his association, if he put an end to his service, he will "rust unburnished" and will act as if to simply breathe were all of his business or fraternal life.

Operating the Injector *

To insure the good working of an injector it is essential in fitting one to a boiler to attend to the following points: The steam lead should be as direct as possible and from the part of the boiler where the steam is the driest obtainable; this pipe should have no other connections and should be with as few bends as possible. The suction pipe should be at least one size larger than the nipple on the injector, and if the source of supply is far away, two sizes larger is preferable. This pipe must be absolutely air-tight, as the slightest leak considerably affects the efficiency of the injector, just as a leaky suction affects a pump.

In long lengths of suction pipe, a check valve placed at a convenient distance to break the draw will be found a great advantage, also a globe valve near the source of supply is a great convenience. A globe valve is placed close to the injector on the supply pipe to regulate the water supply. A check valve must be placed on the delivery pipe between the injector and boiler, to prevent the return of feed water. A stop cock is also placed between the check and boiler to enable the engineer to examine the check valve at any time when steam is up.

Causes that would prevent an injector's working are the following:

(1) Leaky suction. (2) Suction pipe stopped up. (3) Dirt in combining tubes. (4) Water too hot. (5) Steam too low.

Each one of these has its own specific remedy, which will readily suggest itself to the engineer in charge; but the best cure, if I may use the expression, is prevention. Each one of these defects can be prevented from causing any inconvenience if the injector is periodically examined and cleaned and all the piping tested. The mechanism of an injector being delicate and sensitive, it should be treated with care and consideration. Scale or dirt in the tubes can be cleaned off either by scraping or soaking in solution of muriatic acid 1 part, and water 10 parts, and washing properly before replacing; as it requires ten to twelve hours in this solution to be of any benefit, I find the former way the handiest.

If the scale is not taken regularly, the full area of the nozzles will not be obtained and the proper flow will be impeded.

When the suction pipe is stopped up, it can usually be disconnected and cleaned by a rod or by blowing steam through it. The injector should at all times be kept cool, which necessitates the steam valve being always in first-class order, also the check valve requires attention occasionally. If leaks are allowed in them, there is a constant dribble and in waters where there is presence of lime of gymsum a scale is soon formed on the working parts, increasing the friction and reducing the working area of the injector. If the injector has not an independent steam pipe, other valves may be opened, thus taking away the steam, leaving the instrument with insufficient power to drive it.

One great advantage that the injector has over the feed pump is that most of the heat used to force the water into the boiler is utilized in heating the feed water; the feed entering the boiler at a high temperature saves the boiler plates from injury by sudden contraction, which is often the result where pumps put cold water direct into the boiler. It is also a great fuel saver, by introducing feed water up to a maximum of 150 degrees. The following table gives the average pressures, temperatures and lifts:

Lift in ft.	Lowest steam Press. to start.	Maximum Temp. of feed.
0 to 3	15 to 20 lbs.	150 to 140 deg.
4 to 10	25 to 30 lbs.	120 to 100 deg.
10 to 20	30 to 45 lbs.	90 to 75 deg.
20 to 25	45 to 60 lbs.	80 to 60 deg.

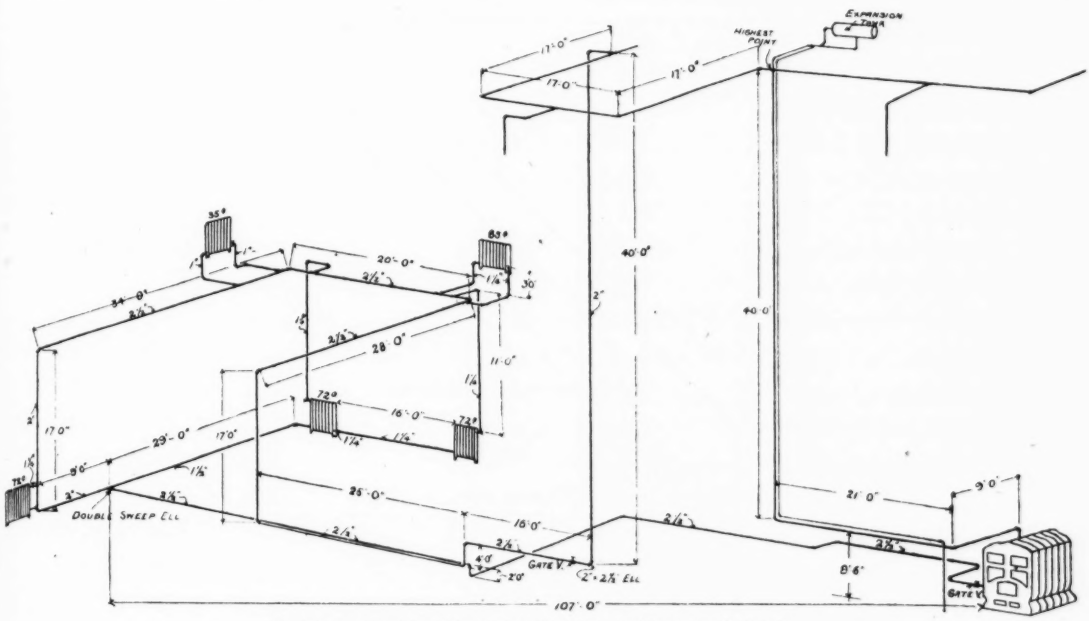
Ventilation of House of Commons.—In connection with the ventilation of the House of Commons experiments carried out by Dr. Gordon have shown that the movement of air at a temperature of from 55 to 65 degrees Fah. at a speed of 1½ feet per second is not felt by anyone; at 2½ feet per second is felt by only a very few sensitive persons; at 3 feet per second is felt by most; at 3½ feet per second is felt by all; at 4 feet per second is felt a distinct draught. A speed of 1½ feet per second has been adopted in the ventilation of the debating chamber.

* A paper read before the Stationary Engineers' Association of Victoria, B. C., by F. C. Winterburn.

OUR READERS' FORUM

QUERY AS TO WATER CIRCULATION.

Chicago.—The following sketch shows arrangement of piping as installed in a residence and stable in this section of the country. The boiler capacity is ample for the entire plant, as well as the piping supplying the residence portion, the circulation being perfect. There are no pockets whatever in the piping, running to stable, and the system is absolutely tight. The system is run as a closed overhead water circulation, the average temperature of water being 160° in moderate weather. The writer would like very much to receive opinions relative to **the results which should be obtained in the circulation of the water** through the stable portion. I will say that the connections from main to radiators on second floor are carried out of the main at a 45° angle, the return enters the main at the side. Standard fittings are used throughout, with the exception of the double elbow, where the two returns join together. Pipes running between the residence and stable are properly protected, the loss of heat being less than 3 per cent. **E. F. C.**



Sketch of Heating Plant Installed in Residence and Stable.

* * *

"RE-SEALING AND ANTI-SIPHON TRAPS."

Chelsea, Mass.—To the Editor of "Domestic Engineering"—**Sir:** H. J. Luff, in an article published in "Domestic Engineering" of March 2 gives some very strong and convincing arguments for and against, but in my judgment in some things he does not strike the right note. For example, his idea of having the outlet through the center and bottom of a drum trap is, I think, poor; when this is done any lint or string hanging over the top of the outlet will cause the water in the trap to be drawn over the top of the outlet, and in time the seal of the trap will be broken.

In my opinion, we do not go far enough with our back-air vents. We now stop at the lower fixture. I believe we should carry the vent pipe down to a point just inside the running trap and connect it there as closely as possible to the water in the running trap. This would give a perfect circulation, for, when a discharge of water comes down the stack, the air would be forced up through the vent connection at the running trap up through the vent system into the soil pipe stack above the upper fixture.

Under this plan it would not matter if the vent above the roof was frozen or not. It would also dispense with the fresh air inlet which is still used in some work.

I consider the fresh air inlet a bad feature. By its use the cold air coming into the drain congeals the grease. It carries the warm air from the hot water coming from the kitchen, quickly to the roof, where, in cold weather,

it stops up the outlet, making the ventilation system useless.

In relation to the syphonage of the drum trap, I have had plugs blow out on the test and never in my experience of twenty-six years have I noticed the seal of a drum trap broken.

If there is any better way of testing a trap better than this it must be in a way which would never come on the trap in ordinary use. I do not claim to be an expert, but I have had a little experience. Very truly yours,

J. W. Buckley.

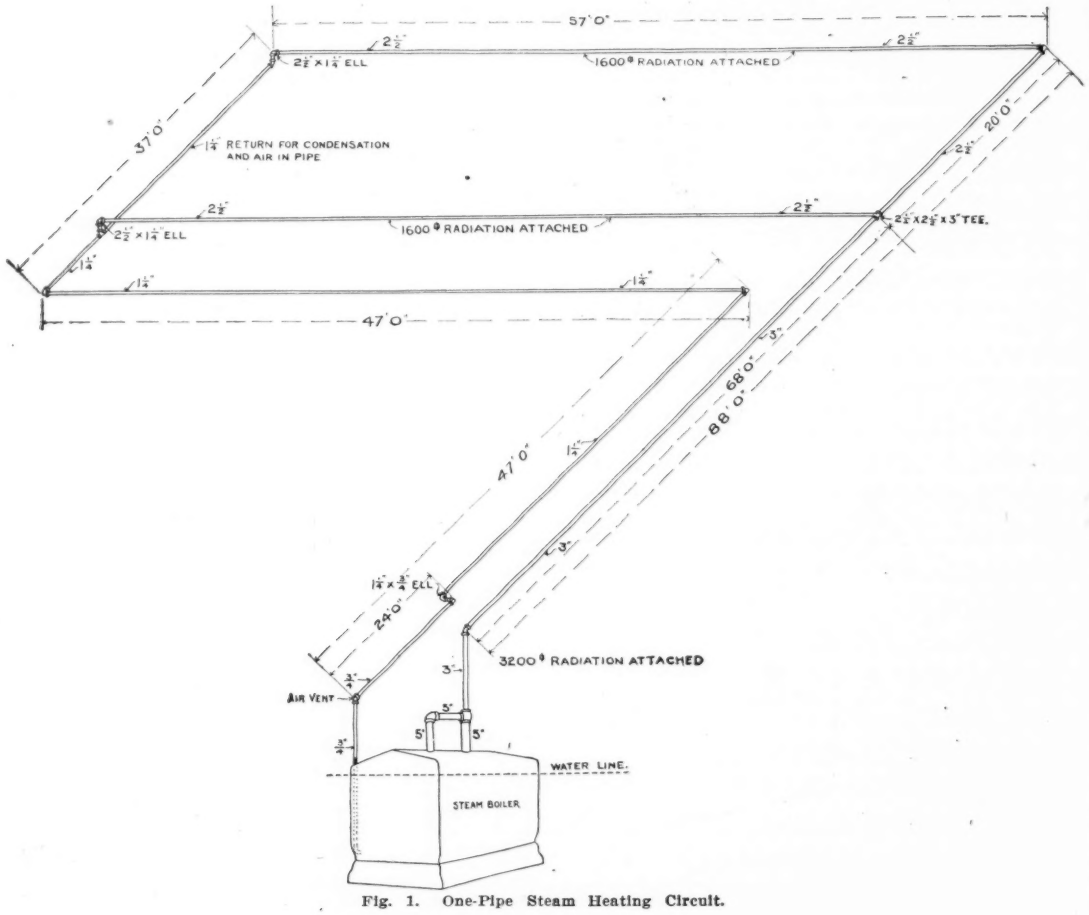


Fig. 1. One-Pipe Steam Heating Circuit.

TWO VERY UNUSUAL HEATING INSTALLATIONS.

To the Editor of "Domestic Engineering," Sir: In fulfilment of my promise, I hand you herewith a brief description of the operation of the **"TWO VERY UNUSUAL HEATING INSTALLATIONS,"** published in "Domestic Engineering" November 10 and 17, 1906, which, after publication, were very freely commented upon.

In Figure 1, which is a one-pipe steam heating circuit, the water will stand in the return line at points varying from four to eighteen inches below the water line, depending upon the intensity of the fire. In starting up the apparatus in cold weather it requires about nine minutes for the steam to make the circuit of the piping. In all the time the apparatus has been in use we have never yet seen the ¾" return run full of water. When starting the apparatus on cold mornings the water will at first fill the ¾" glass nearly full, but normally it runs a little less than half full.

The pipe drops about two inches in ten feet. The radiators will heat throughout at all times when there is sufficient vapor to fill them. They will easily heat at any slight pressure above atmosphere—say, with a temperature in the steam leaving the boiler of 212 deg., which at the altitude is equivalent to about four ounces.

The operation of this experimental job has been so satisfactory that another job has been installed in the same factory where one 2" main supplies 1,600 square feet of radiation, the nearest radiator being 200 feet from the boiler. The return in this instance is ¾" the entire length.

All this radiation (1,600 square feet) will fill quickly at atmospheric pressure, and the apparatus is so arranged that the temperature of the steam leaving the boiler

may be reduced to 180 deg. and keep all the radiators warm.

Still another plant has been installed in an adjoining factory where 4,000 square feet of radiation is supplied by a 2½" pipe, the initial pressure in this case being from ten to fifteen pounds. The steam is carried through the 2½" pipe about 300 feet and is then reduced to two pounds. From the point of reduction two lines of pipe starting with 2½" and ending with 1", carry each 2,000 square feet of radiation. Each radiator contains 100 square feet and is supplied by a ¾" branch from the bottom of the main, the mains being carried on the ceiling of the shop above the radiators. The return is ¾" and 1".

The operation of the apparatus is very satisfactory in every particular. A thermometer with a deep mercury well is inserted in the steam dome and during cold weather the dampers are so regulated that the thermometer will show 212 degrees, which is equivalent to about four ounces pressure above atmosphere at the altitude.

The end of the air line is so arranged that it can be closed with a valve, and is kept closed nearly all the time. With the valve closed, the boiler will run eight or ten hours at a temperature of 180 deg. and every loop of radiation will be warm.

The boiler will run without attention in cold weather for ten or twelve hours. After coaling the boiler at night it has no further attention as a rule until about noon the next day, when a small quantity of coal will be put on to keep the fire from getting too low. Regular firing will then be done again at night. During very cold weather with high winds we find it necessary at times to throw on a little coal about 8 o'clock in the morning. The temperature of the house is very even, a recording thermometer showing a change of less than five degrees Fahrenheit in a week.

Quite a few jobs of this kind have been installed in this neighborhood and each one is an agreeable surprise, both to the owners and the heating men who install them.

W. E.

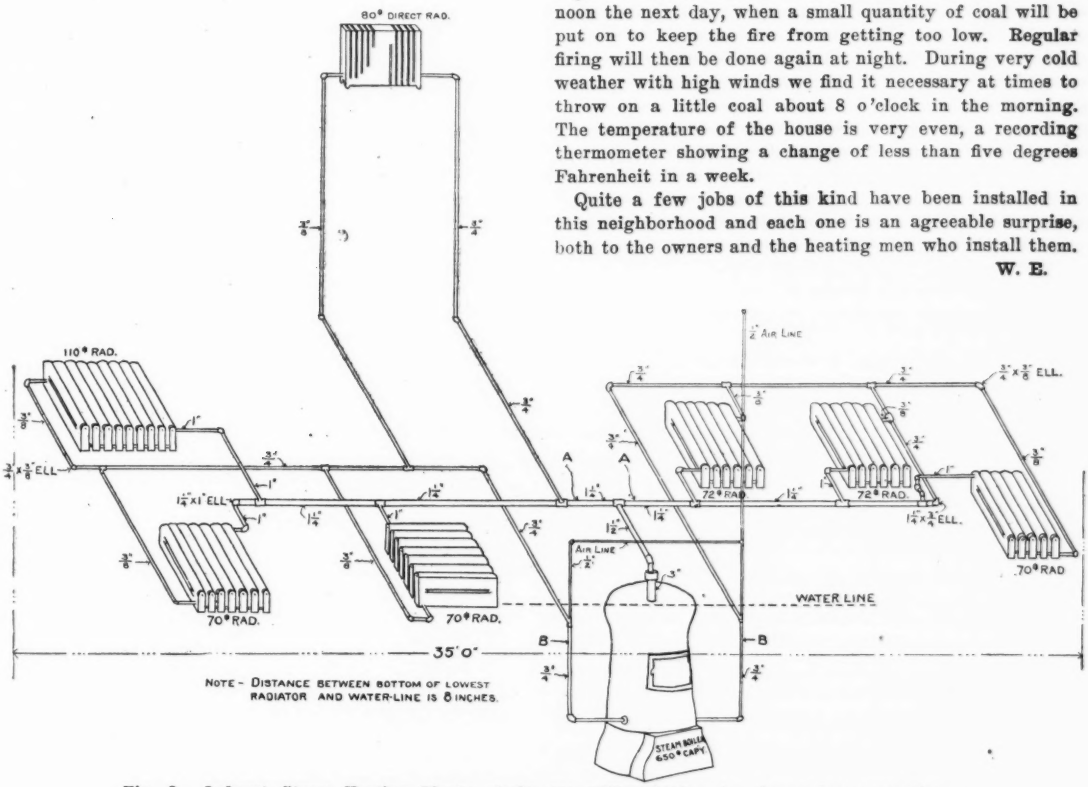


Fig. 2. Indirect Steam Heating Plant; stacks are without boxing to show pipe connections.

Of course in this case a pump is used to put the water back into the boiler, as the pressures are unequal.

In neither of these installations is the small pipe used to reduce the cost, but because better results are attained than are possible with larger sizes.

The apparatus described in Figure 2 is in my own house and is now going through its second winter. The pipe sizes are exactly as shown on the plan, and the distance from the bottom of the radiators to the water line is as stated—eight inches.

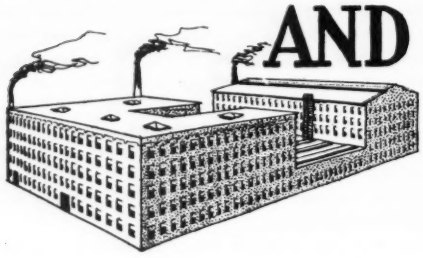
The water stands in the return about six inches below the normal water line, and never at any time has there been any water carried into the radiation.

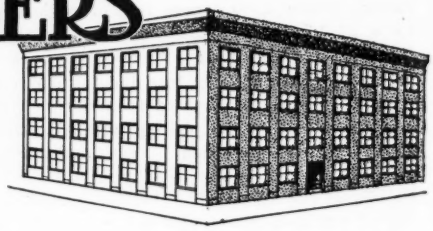
HE COATS THE INSIDE OF THE BOILERS WITH OIL FOR THE SUMMER.

New York, N. Y.—To the Editor of "Domestic Engineering." Sir: Referring to the article "Care of Heating Boilers in Summer," I wish to state that I have found it a good practice to pour two or three gallons of oil into the boiler from the top and thereafter empty the boiler. As the oil remains on the surface of the water it coats the inside of the boiler while the water is being drawn out, thus preventing the boiler from rusting. Whatever oil comes out with the last few gallons of water I try to save, using it on my machinery. Yours truly,

Benj. Roth.

FROM THE MANUFACTURERS AND JOBBERS





Wholesale Plumbing

The Central Brass Manufacturing Company, of Cleveland, Ohio, has appointed Joseph Roylance as its Pacific coast representative. He has had many years' experience with the trade in that section.

The Eastern and Confederated Supply Associations, through Secretaries Hanley and Blatchford, have arranged to hold a joint meeting at the Pine Beach Hotel, Pine Beach, Va., on Wednesday and Thursday, June 5 and 6. The hotel is within a few minutes' walk of the Jamestown Exposition grounds, and consequently a well attended and enthusiastic meeting is anticipated.

W. A. Roosevelt Company, jobber of plumbing and heating supplies at 122-128 South Front street, La Crosse, Wis., had its entire plant and stock destroyed by fire on Friday, March 29. The fire started in an adjoining factory. The Roosevelt Company's loss is placed at $60,000 and it carried insurance to the amount of $43,500. A new building was rented the same day and the supply business was resumed at once.

Federal Company, of Chicago, will on May 1 move its business at Market and Washington streets to an eight-story building at 50-60 North Halsted street, corner of Fulton. This structure, which it has leased for a term of years, has a frontage of 125 feet on Fulton street and 100 feet on Halsted street, and is now being equipped to suit its needs. The general offices, display rooms, factory and various warehouses of the company—with the exception of its branch at Lincoln avenue and Montana street—will be concentrated at this point, which will be its future home.

The plumbing and steam supply salesmen who travel through the state of Maine had a social gathering and banquet at the Falmouth Hotel, Portland, Me., Monday evening, March 25, which was the first of its kind ever held in that vicinity for the purpose of promoting good fellowship and sociability among the salesmen in that section of the country. The earlier part of the evening was devoted to a social hour with the committee of arrangements, E. F. Hayden, C. R. Nelson, J. W. Chase, E. A. Morris, and A. E. Campbell acting as a reception committee. About 9 o'clock the party marched to the "State of Maine" room, where a most pleasing banquet was served in a manner that could not be surpassed. The menu contained many palpable "hits" that aroused much good humor and mirth during the evening. Among those about the tables were: C. H. Rollins, of the Sanitas Mfg. Company, Boston; E. F. Hayden, of the Geo. E. Gilchrist Company, Boston; C. R. Nelson, of the Smith & Anthony Co., Boston; W. E. Snow, of the Dalton-Ingersoll Mfg. Company, Boston; J. Warren Chase, of W. L. Blake & Co., Portland, Me.; A. E. Campbell, of the W. H. Gallison Company, Boston; R. F. Burns, of the Magee Furnace Company, Boston; A. B. Worthen and W. D. Clark, of the Richardson & Boynton Co., New York; H. W. Clark and E. H. Morris, of the Pierce, Butler & Pierce Mfg. Co., Syracuse; J. G. Forrest, of the Gurney Heater Mfg. Company, Boston; T. P. Healy, of the International Heater Company, Utica, N. Y.; H. W. Stowell, of E. F. Butler & Co., Boston; Arthur D. Brackett, Francis L. Daly and Geo. H. Ayer, of the F. W. Webb Mfg. Company, Boston; K. K. Wilson and Phillips Eaton, of the American Radiator Company; H. J. Payne, of the Brown-Wales Company, Boston; J. J. Bennett, of H. B. Smith Company, Westfield, Mass.; W. E. Curtis, of the National Lead Company, New York; J. M. Griffith, of the Fairbanks Company, New York; John H. Douglas, of the Smith & Abbott Co., Portland, Me.; L. R. Mitchell, of the Walworth Mfg. Company, Boston; E. L. Bent, of Sumner & Gerald, Boston; Albert M. Parker, of the J. H. Young Company, Boston; L. E. Little, of the Louis Lipp Company, Cincinnati. While all were enjoying the repast musical numbers were rendered by an orchestra. During the postprandial exercises C. H. Rollins was introduced by E. F. Hayden in a most pleasing manner and acted as toastmaster in a style all his own and hard to equal. Appropriate remarks were made by all present and an original poem, in which mention was made of all in attendance, was read by its author, A. E. Campbell, and added much to the enjoyment of the evening. The introductory lines of the poem were as follows:

"The writer has been called upon
In language that is plain,
To dedicate a verse or two
To the drummers down in Maine,
Who sell the goods now being used
In plumbing, gas and steam.
While our bunch may not catch it all,
No doubt they get the cream,
Of an ever growing business
In this a thrifty state,
Which calls for nothing short of best,
Thus keeping up to date.
So here's a health to the Pine Tree State,
With its old traditions dear,
And a hope we'll all enjoy ourselves,
And meet again next year."

It was voted to make the organization a permanent one and the same committee, who worked so faithfully to

make the first meeting a success, was elected to serve the coming year and arrange for subsequent annual or semi-annual meetings as well as choose a suitable name for the association.

THE RESALE PRICE.

Portland, Oregon.—To the Editor of "Domestic Engineering."—Sir: **We wish to endorse the program outlined in "Resale Price the Corner Stone of Reciprocity."** It is impossible to get away from the facts cited, and, sooner or later, jobbers have to admit the sensible statements of both simple and complex conditions and actions referred to by "Manufacturer," for they, no less than manufacturers, are subject to the "first law of nature" even if they eliminate the common sense involved in the conduct of successful business. Yours truly,

The Gauld Company,
J. G. Gauld, Vice-president.

Quincy, Ill.—To the Editor of "Domestic Engineering."—Sir: We have read with interest the article on "Resale Price the Corner Stone of Reciprocity." From our experience, **we can heartily endorse the position which "a manufacturer" takes,** and do not see how any one in the supply business can take the other side. To a great extent this reform comes within the province of the manufacturers themselves, although we presume that the jobbers, by taking enough interest, can bring considerable pressure to bear. Should any movement be started among the latter, we shall be glad to give such assistance as we can toward bringing it to a successful culmination. Very truly yours,

Hollister-Whitney Co.,
J. H. White.

Omaha, Neb.—To the Editor of "Domestic Engineering."—Sir: I have carefully read the article on **"Resale Price the Corner Stone of Reciprocity"** and **the sentiments expressed have my hearty endorsement.** I think the communication a very timely one. It is, however, a rather lengthy article. The writer of it has undoubtedly given the subject considerable thought and deserves commendation for expressing his views. The trouble in this busy life of ours is we do not give such matters as much thought and attention as we should, and I firmly believe this is along the right lines. Yours truly,

J. B. Rahm.

New York, N. Y.—To the Editor of "Domestic Engineering." Sir:—The article on "Resale Price the Corner Stone of Reciprocity" has been carefully read by us. There is no doubt but that the writer of this article has had a wide experience in that branch of the business, known as the Plumbing Supply business, extending to the Iron Pipe and Fitting business, applying to both plumbing and steam goods.

Anyone who carefully reads this article, weighs the subject and makes a little investigation, compares the results achieved in his own line of business, will have to admit there is considerable truth in what is set forth in the article in question.

In the last part of the article "How to Protect the Jobber," **the keynote of the situation is struck.** If manufacturers would only realize that to run distributing or branch stores in different cities, costs them 25 per cent of their sales, they would at once know that it is absolutely necessary to hold up the hands of the present jobbers and distributors and put them in a position to do a profitable business, so that they can safely sell them their output and be assured of receiving full payment therefor.

The present condition is, that the majority of manufacturers pretend to sell the jobbers at a low price, but as a matter of fact, they allow but 5 per cent margin over what they will sell in small quantities to the consumer or plumber, so long as they are not found out.

It is also a fact, that there are some manufacturers who are so blind to their own interests, that they will go on selling the major portion of their product to a few jobbers and distributors at ruinous prices and then they wonder why it is, that they cannot make a profitable return on their capital. The result is pointed out plainly in this article. The jobbers who have gotten the advantage of this low price, find themselves always in a position to cut the market price a little and they can do this and still make more money than their brother jobber, who had been obliged to pay a higher price.

A "Reciprocity Agreement," with the best manufacturers and the best jobbers and distributors, which both would agree to and live up to in all cases, **ought to be the salvation of both.**

It is a pretty well assured fact at the present time, that the Plumbing Supply business today costs at least 15 per cent of the sales, for the cost of conducting business. Of course, this is assuming that the business is handled in a conservative way, and there is enough business.

Yet we find, as is stated, there is a tendency constantly to take an amount of business at a figure that will not admit even of this 15 per cent return, let alone an additional profit, the cry being for large orders there should be a reduction in price, whereas it should be the other way—because the larger the order, the worse the result.

The main difficulty with jobbers and distributors in this line of business is, that they do not go deep enough into their costs. Years ago, the business was such, that there would be on the books a diversified class of buyers. In some cases there would be profits ranging from 50 to 100 or 200 per cent—small buyers, too, but still they aggregated considerable in a year's time, and in addition to this a class of close buyers, who always bought within 2½—5 or 10 per cent of cost. Now if the average of the buyers at the high rate was enough to offset the loss of the buyers at the low rate, the losses were made up at the end of the year, and would show an adequate return for money invested.

For the past few years, however, all classes and conditions of buyers and consumers, have been educated up by trade journals and by a host of salesmen, to the possibilities of their positions as buyers in an open market; they have not failed to profit thereby. The result is today, **the majority of the buyers on the books of the ordinary supply houses, are close buyers;** by that we mean, they take advantage of every opportunity to work one salesman against the other, and when in the market get figures from six or a dozen houses and they take advantage of every chance offered, to play one set of prices against another; hence the supply houses take the bulk of the business at a margin which is under 10 per cent profit. **If this continues, and the other class re-**

duces in time, it is only a question of a short while when there will be found a balance on the wrong side of the ledger, and then it will be necessary to close up the establishment.

There has been only one saving salvation for the jobber for the past few years, that is, the opportunity to speculate in material. If he had money, he could buy when the price was low, put it in his storehouse and then get the advantage of his purchase later. This method is all wrong, however, and eventually he will be caught with a lot of material on hand at high prices, which he will be obliged to sacrifice at low figures, and **there will be a day of reckoning.**

All the foregoing has been suggested to the writer, by reading over the article above referred to, and as before stated, it would seem that **the plan suggested by the writer of the article, properly worked out, will cover the situation; at any rate, is a step in the right direction.**

The manufacturer ought to see, that some such arrangement will have to be made for his sake as well as for the jobber or distributor, or he will be obliged to take money losses and eventually establish his own distributing houses in his different selling localities, at enormous initial expense and constantly growing fixed charges. Yours truly, **C. H. S.**

Wholesale Heating

The Harris Ventilator Company, of Erie, Pa., has been incorporated with a capital of $5,000.

Kewanee Boiler Company, of Kewanee, Ill., is making preparations for the removal of its Chicago office and salesrooms from 167 East Lake street to 35 Michigan avenue, where it will have better facilities for its business.

The American Heater Manufacturing Company, of West Chicago, Ill., has completed the erection of a modernly equipped plant for the manufacture of its line of Rococo heaters and radiators. E. M. Fancher, well known among the heating trade, is general manager of this concern. Its Chicago office will be located in the neighborhood of Dearborn and Lake streets.

The Haynes-Thompson Company is the style of a new firm which is making preparations to engage in business at 705 Chestnut street, Philadelphia. It intends to deal in heating and gas supplies and to manufacture plumbing specialties. The members of the firm are Charles V. Haynes, formerly connected with the Philadelphia branch of the American Radiator Company, and Edw. S. Thompson, formerly with the Haines, Jones & Cadbury Company.

Kewanee Boiler Company, of Kewanee, Ill., suffered some damage to its plant in the cyclone gale which visited that locality on Friday, March 29. Fortunately the damage was confined to one of its brick additions, in which the company does its light sheet iron work, and it amounted only to about $1,500, fully covered by insurance. The disturbance was not sufficient to make it necessary to stop operations in any of the other departments, and the damage will be repaired within a few days.

Creditors of the Lorain Heating and Supply Company, of Lorain O., which was adjudicated a bankrupt on March 19, have been notified that a meeting will be held on Monday, April 15, at 10 a. m., in the office of P. H. Boynton, referee in bankruptcy, in Elyria, O., which the creditors may attend to prove their claims, appoint a trustee and transact such other business as may properly come before the meeting. The schedule filed in bankruptcy shows that the company's liabilities amount to $4,632, while its assets are $2,132.

INDUSTRIAL STOCKS

The following are the prices bid and asked on the following industrial stocks, listed on the Chicago and New York Stock Exchange, at the close of business on Thursday, April 4:

	Bid.	Asked.
American Radiator Co., com	132	135
American Radiator Co., pfd	128	130
American Steel Foundries, com	8	9
American Steel Foundry, pfd	34¾	35
Amalgamated Copper	92⅝	92⅞
National Lead Co., com	59½	59¾
National Lead Co., pfd	98	99¼
Nat. E. & S. Co., com	10¾	11
Republic Iron & Steel, com	26½	26¾
Republic Steel & Iron, pfd	82½	82¾
U. S. Cast Iron Pipe Co., com	36	36½
U. S. Cast Iron Pipe Co., pfd	79	82
U. S. Steel, com	36½	36⅝
U. S. Steel, pfd	98¾	99

METAL MARKET

New York Metal Market, April 2.

Copper, Lake	$25.75
Copper, Electrolytic	25.75
Copper, Sheet	**32.00**
Antimony, Cookson's	24.50
Lead	6.25
Spelter	7.10
Straits Tin	40.50

Chicago Iron Market, April 4.

Second Half, 1907, Delivery.

Southern, No. 2 Foundry	$22.10@22.60
Lake Superior Charcoal	25.50@26.00
Lake Superior Coke Iron, No. 2 Foundry	23.50@24.00

April 4—

Foundry iron was the same price as the week previous.
the same price as the month previous.
$4.00 per ton more than the year previous.
Copper was the same price as the month previous.
7 cents per pound more than the year previous.

Copper users have been somewhat relieved during the past week at the fact that quotations from London have been lower and lower rates are looked for in this country. Several large copper producers, who sell their own copper direct, are quoting prices half a cent higher than the New York Metal Exchange or London quotations, but unfortunately they have no spot copper to offer. Bids of 26 cents for June delivery have been made and in some instances accepted during the past week and still better conditions are looked for. The New York Metal Exchange quotations are much lower than the actual sell-

ing agencies, but unfortunately the metal exchange handles no actual copper.

The strength of the pig iron market in the face of the extraordinary conditions in Wall street and other financial centers is conspicuous. As a matter of fact, with no stocks on hand and all the available output sold up to the fourth quarter, there seems to be no possibility of the activity in iron falling off for several months to come, says Rogers, Brown & Co. The market could not be in a stronger position to withstand all the prophesies of early doom that have been aimed at it by the "bear" party in the stock market, and, so far, the whole steel and iron fraternity have followed Mr. Carnegie's recent advice, "to attend to business and leave the stock gamblers alone."

Oswego, N. Y.—The Howard Thermostat Company will shortly move from its present location at 119 West First street to improved quarters—probably in the new Industrial building.

PERSONAL

John D. Hibbard, president of the John Davis Company, Chicago, has returned from a month's sojourn in the Bermudas.

W. E. Mellinger, Michigan representative of the Kellogg-Mackay-Cameron Company, of Chicago, has established headquarters at 244 Auburn avenue, Grand Rapids, Mich., from where he will be able to handle the trade better than from Chicago.

A view of R. B. Moodie, president of the National Association of Master Plumbers and W. W. Wilcox, president of the Indiana State Association, in attendance at the recent Indiana State Convention.

William R. Wheeler, manager of Holbrook, Merrill & Stetson, of San Francisco, has been appointed by President Roosevelt a member of the United States Immigration Commission.

James P. Marsh, president of the James P. Marsh Company, of Chicago, has the sympathy of his many friends in the trade on account of the demise of his wife, Mrs. Fannie Davis Marsh, which occurred at Hot Springs,

Ark., on Saturday, March 30. The funeral took place from the family residence, 3222 Michigan avenue, Chicago, on Tuesday afternoon, April 2.

H. F. Weaver, general manager of the National Pottery Company, of Evansville, Ind., has just returned from a 6,000-mile trip to New Orleans and the Pacific coast, on which he was accompanied by his three-year-old son Charles. Mr. Weaver says that business on the coast is in a good, healthy condition, but that it has been retarded by an unusual amount of rain.

OBITUARY

Strange, is it not? that of the myriads who
Before us passed the door of Darkness through
Not one returns to tell us of the Road,
Which to discover we must travel too.
—Omar Khayyam.

Edward E. Morrill, secretary and treasurer of the John Davis Company, of Chicago, passed on at his residence, 229 North Sixty-second avenue, Oak Park, on Wednesday evening, April 3, in his fiftieth year. He had been connected with the John Davis Company since 1876, when he was employed as a clerk, from which position he rose until he reached the responsible offices held by him at the time of his demise. Funeral services were held at his late home on Friday, April 5, and the interment will take place at his old home at Boscowan, New Hampshire.

Harry Mills, a prominent master plumber of East Orange, N. J., passed on at his residence at 15 Glenwood avenue in that place on Saturday, March 23, after a short illness. Mr. Mills, better known as "Chief" among his many friends, was born at Kent, England, sixty-one years ago. He engaged in business in 1871 and was a member of the firm of Cahill & Mills at No. 10 Washington place. He was a member of the Master Plumbers' Association and a charter member of the Exempt Firemen, both of which organizations were well represented at his funeral. He was chief of the Fire Department for nine years and at the time of his demise was excise commissioner, being appointed to that office about a year ago. His widow and eight children survive him,

ASSOCIATION NEWS

Tampa, Fla.—The Florida State Association of Master Plumbers will hold its annual convention in this city on Wednesday, May 8, 1907.

Macon, Ga.—The Georgia State Association of Master Plumbers will hold its annual convention in this city some time during the month of June.

Nashville, Tenn.—The date for the forthcoming annual convention of the Tennessee State Association of Master Plumbers, to convene in this city, has been changed to April 23.

Newark, N. J.—The annual convention of the New Jersey State Association of Master Plumbers will convene in this city on Tuesday, May 7. The meetings will be held at Achtel Stetter's hall, 844 Broad street. The local association will tender a banquet to the visiting members in the evening.

New York, N. Y.—The Manhattan branch of the New York City Association of Master Plumbers will hold an **"Open Meeting"** and **"Smoker"** at the Lexington assembly rooms on April 16. An invitation to attend will be sent to every master plumber in the city, whether he be a member of the association or not. The association also announces that it will hold a **"Barn dance"** on Wednesday evening, May 8.

Newark, N. J.—The entertainment committee of the Master Plumbers' Association, composed of A. Seldon Walker, chairman; Ira Budd, F. J. Sturn, Walter Champlin, C. F. McGuire and S. Wilson, are endeavoring to procure a date for holding the annual excursion and outing of the association, which usually takes place the latter part of July or the first of August. They are considering points along the Shrewsbury river as a place for landing.

Chicago, Ill.—The Chicago Master Plumbers' Association is making elaborate arrangements for a stag and smoker to be given to its members on Saturday evening, April 13, in its hall in the Schiller building. The entertainment committee has secured some excellent vaudeville talent and a most enjoyable affair is anticipated. The next social event of the association is scheduled to take place toward the end of May, when its twenty-fifth anniversary will be celebrated.

Boston, Mass.—Plans for the entertainment of the delegates to the annual convention of the State Association of Master Plumbers, which meets in Boston on May 9, are fast assuming definite shape, although the committee which is arranging them is as yet unwilling to give out any details for publication. The attendance at the annual meetings of the associations in the past has been exceedingly large and the fact that the meeting is to be held in Boston this year is expected to draw an even larger attendance than usual. Committees are at work securing hotel accommodations, arranging for the banquet on the evening previous to the convention and making other necessary preparation for the event.

Chattanooga, Tenn.—The Master Plumbers' Association of this city, which was recently incorporated under the laws of Tennessee, has organized and elected the following officers: Fred Fox, Jr., president; Harry T. McQuade, secretary; A. C. Williams, treasurer; board of directors: R. O. Carlin, J. R. Cotter, J. Cornes, Ed. Bork and J. W. Martin. The purposes for which the association was incorporated are: For the advancement of sanitation and the encouragement of sanitary laws and the enforcement thereof, for the improvement of plumbing appliances and plumbing work. For the education of the members of the craft in sanitation and in all that pertains to the betterment of plumbing and the best methods of conducting such business. For the establishment of harmonious and equitable relations between master plumbers, journeymen plumbers, and other employes and manufacturers and jobbers in supplies used in plumbing, heating, gas fitting and drainage business. For the education of the apprentice in plumbing and the establishment of an apprenticeship system.

Chicago, Ill.—Members of the Gas Fitters' Union went on strike Monday morning, April 1, because the Master Plumbers' Association refused to accede to their demands. The strike involves about 200 men, practically

every gas fitter in Chicago. Unless the difficulty is speedily adjusted the situation threatens to involve contractors in much trouble with architects and builders for failure to finish contracts on time. An increase in pay from $4.50 to $5.20 a day is demanded by the strikers. The scale of $4.50 a day was based on an agreement between the Gas Fitters' Union and the Chicago Master Plumbers' Association, which expired on March 30. On Friday the demands were submitted to the arbitration committee of the employers' organization. It was decided unanimously to reject them. A compromise was offered by the employers in an offer to pay the men $5 a day for the first year, and $5.20 a day for the second year of the new proposed agreement. The gas fitters insisted on a flat scale of $5.20. The negotiations ended in a deadlock, with the result that gas fitters refused to go to work Monday morning.

COMMENCEMENT EXERCISES OF THE NEW YORK TRADE SCHOOL.

New York City, N. Y., April 3.—[Special.]—The twenty-sixth annual commencement exercises of the New York Trade School were held on this night in the assembly hall of the institution at First avenue and Sixty-seventh street. A large class in each of the branches taught at the school was graduated, making a total of 224 which included young men from all parts of the United States, one from Norway, two from Canada and one from Japan. **Robert Fulton Cutting,** president of the school, in making the opening address, told the boys that he wanted each of them to go out into the world with a hope that he would make millions, so that some day he could come back to the institution as its president. **Martin W. Littleton,** former president of the Borough of Brooklyn, was the speaker of the evening. Mr. Littleton declared that he had decided to take a rest from politics, because of the complexion of the game during the last two years. In the school he said great good was being done. Man in years gone by had been trained to fight, then after conquest as an ambition came discovery, then the crusades, then literature and art —today the thought of the world, for the most part, was taken up with the material advancement. It was not bad unless carried to a point where men became dishonorable with their neighbors and with themselves. Sometimes the madness of man for gain took him beyond the laws.

The presentation of prizes was next in order. The medal for the student passing with the highest average percentage, presented by the Master Steam and Hot Water Fitters' Association of New York, was presented by **George A. Suter,** of the examining board of the Trade School Committee of that association, to **F. J. Weider,** of Rochester, N. Y. His average was 96¼ per cent. John E. Miller, of Erie, Pa., was the proud winner of the gold medal presented by the Master Plumbers' Association of Manhattan. **Thomas J. Tuomey,** of the Trade School examining board, made the presentation. The presentation of honor rolls—there were twenty-eight students on this list—was made by **J. Pierpont Morgan, Jr.,** of the board of trustees. The presentation of certificates of graduation was made by **John H. McCullough** and **William H. Oliver,** of the General Society of Mechanics and Tradesmen, of New York. There were 104 graduates in the plumbing class and the class in steamfitting consisted of thirteen men.

CONVENTION DATES.

April 10, 1907.—Annual convention of the **Alabama State Association of Master Plumbers,** at Montgomery, Ala.

April 10, 1907.—Meeting of the executive committee of the **Missouri State Association of Master Plumbers** at Kansas City, Mo.

April 16, 1907.—Annual convention of **Pennsylvania State Association of Master Plumbers,** at Harrisburg, Pa.

April, 23, 1907.—Annual convention of the **Tennessee Association of Master Plumbers** at Nashville, Tenn.

April 30, May 1 and 2, 1907.—Seventh annual convention of the **Association of Master Plumbers of California** at San Diego, Cal.

May 7, 1907.—Annual convention of the **New Jersey State Association of Master Plumbers** at Newark, N. J.

May 8, 1907.—Annual convention of the **Florida State Association of Master Plumbers** at Tampa, Fla.

May 8, 9 and 10, 1907.—Annual meeting of the **National Supply and Machinery Dealers,** the **American Supply and Machinery Manufacturers' Association** and the **Southern Supply and Machinery Dealers' Convention,** Cincinnati Ohio, with headquarters at the new Hotel Sinton.

May 9, 1907.—Annual meeting of **the Massachusetts Association of Master Plumbers,** Elks' Hall, Boston.

May 15, 1907.—Annual convention of the **Connecticut State Association of Master Plumbers** at Hartford, Conn.

May 21, 22 and 23.—Annual convention of the **National Association of Master Steam and Hot Water Fitters,** at the Arlington Hotel, Washington, D. C.

June 24, 1907.—Annual convention of the **Kentucky State Association of Master Plumbers,** Louisville, Ky.

June 25, 26 and 27.—The twenty-fifth annual convention of the **National Association of Master Plumbers** at Louisville, Ky.

CHANCES FOR BUSINESS

Jobbers and Manufacturers are requested to send catalogues as indicated to the parties whose names are given in the list below. This request does not necessarily involve quotation of prices and discounts: Lanyon & Co., Clayton and Genesee streets, Waukegan, Ill., catalogues of plumbing, heating and lighting supplies; F. J. Zimmerly, 216 West Berry street, Fort Wayne, Ind., catalogues of plumbing, heating and lighting supplies; J. H. Garrison, 1511 Stiner street, San Francisco, Cal., catalogues of plumbing and heating supplies, plumbers' brass goods and steam brass goods, water closet combinations and porcelain enameled goods and pipe and boiler coverings; R. H. Watkins, 15 Park street, Barre, Vt., catalogues of plumbers' and steamfitters' tools; B. J. Town, East Forty-first street and Holgate avenue, Portland, Ore., catalogues of plumbing supplies and brass goods, and pipe and boiler coverings; Robert C. Johnson, Lock Box 478, Central City, Colo., catalogues of water closet combinations and porcelain enameled goods; E. L. Perry, Sprague, Wash., catalogues of plumbing and heating supplies, plumbers' brass goods and steam brass goods, water closet combinations and porcelain enameled goods, and plumbers' and steamfitters' tools.

THE LABOR FIELD

Troy, N. Y.—The journeymen plumbers in this city went on a strike on Monday, April 1, for higher wages.

Fitchburg, Mass.—The journeymen plumbers have gone on a strike for an increase in wages from $3.25 to $3.50 a day.

Elmira, N. Y.—The master plumbers of this city have granted an increase in wages to the local journeymen from $3.00 to $3.50 per day.

Spokane, Wash.—It is reported that the plumbers' union has decided to ask for an increase in wages from $5.50 to $6 a day of eight hours. The master plumbers have not yet been notified of the proposed increase.

Richmond, Va.—With a view towards settling the differences with the local journeymen's union, the master plumbers of this city have suggested placing the complications again before an arbitration committee.

Lexington, Key.—The journeymen plumbers of this city are making a demand for an increase in wages of 50 cents a day for eight hours' work. They have been receiving 40 cents an hour for nine hours' work.

Akron, Ohio.—It is reported that the journeymen plumbers are planning to make a demand for shorter hours and higher wages. The present schedule calls for a nine-hour day, and the wages are said to be 40 cents an hour.

Poughkeepsie, N. Y.—The journeymen plumbers of this city have asked for an increase in wages from $3 to $3.50 a day and a half holiday during the months of July and August. The master plumbers will meet at an early date to consider the matter.

Seattle, Wash.—The building outlook in this city is very bad. The Association of Master Builders has locked out all hands and has declared that they will resume on the open shop plan unless their demands are acceded to. Some work is still being done as all contractors are not members of the association, but it is feared that matters will become worse rather than better during the coming month.

Hammond, Ind.—The differences existing between the master plumbers of this section and the local journeymen's union were formally settled at a meeting attended by members of the arbitrating committees in Union Hall on Monday of this week. The wage question has been left open. The minimum scale will be as formerly—$4 per day—though the members as individuals will pay the men above that figure, according to their worth. Eight hours and a half day on Saturday will constitute the day's work.

Lynn, Mass.—The local journeymen plumbers expect to receive a wage increase of 25 cents per day under the new agreement which goes into effect here on May 1. Heretofore the journeymen have received $3.75 per day; now they seek $4. The union officials report that informal conferences with the master plumbers have resulted in an understanding that the increase will not be opposed, the union having shown that the extra cost of labor will be made up to the employers through increased rates for plumbing work. The new agreement will be formally presented in a few days.

BUSINESS VENTURES

Jamestown, N. D.—Wm. A. Eagan has engaged in the plumbing and heating business in this city.

Ida Grove, Ia.—The Pilcher Hardware Company has added a plumbing and heating department to its business.

East Moline, Ill.—C. R. Stokes, formerly of Dell Rapids, S. D., is planning to open a plumbing establishment here.

Pittsburg, Pa.—Gray & Fuhrer have opened a new plumbing and heating establishment at 4515 Liberty avenue.

Brookings, S. D.—L. H. Skiff will engage in the plumbing business here, having leased attractive quarters on Main street.

Woodstock, Ill.—A new plumbing firm will engage in the business here on April 15 under the style of Ercanbrack & La Mere.

Kansas City, Kan.—The Wyandotte Plumbing and Heating Company has been incorporated here with a capital stock of $6,000.

Centralia, Ill.—The plumbing firm of Cunningham & Co. has been incorporated as the Centralia Iron and Plumbing Company.

Carroll, Ia.—The Carroll Heating and Plumbing Company has opened a new establishment under the management of G. M. Bayley.

Mankato, Minn.—McGraw & Himmelman have engaged in the plumbing business here with suitable quarters in the new Fowler & Pay building on North Front street.

St. Louis, Mo.—W. L. Clucas Plumbing Company has been incorporated with a capital of $2,500. The incorporators are W. L. Clucas, R. W. Pauley and I. H. Clucas.

Paterson, N. J.—H. Lauer & Sons is the style of a new firm that has engaged in business at 7 Prince street. They will do heating, ventilating and sheet metal work.

St. Louis, Mo.—John Lyons Plumbing Company has been incorporated with a capital of $2,000. The incorporators are John Lyons, Appolonia M. and Helen V. Lyons.

Austin, Texas.—Bacon & Hancock is the style of a new firm which has just opened a plumbing establishment in the Sampson building at 103 West Seventh street.

St. Louis, Mo.—Hoban Plumbing and Heating Company has been incorporated with a capital of $5,000. The incorporators are Thomas F. Hoban, Gustave Strauss and Fannie Strauss.

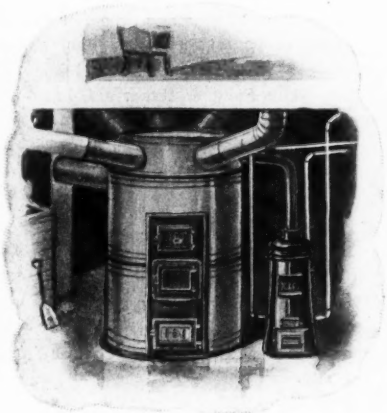
Raleigh, N. C.—The Farmer-Cole Plumbing Company has been incorporated with a capital of $5,000. The incorporators are Charles D. Farmer, Eugene C. Cole and Walter P. Wrenn.

Sheridan, Wyo.—Diefenderfer & Dinwiddie Co., of 49 North Main street, has been incorporated with a capital stock of $60,000 to conduct a plumbing, heating and hardware business.

East Pasadena, Cal.—The East Side Plumbing Company is the style of a new firm that has engaged in business on Colorado street. They desire catalogues and price lists from jobbers and manufacturers.

"When Fires are Out."

When hot air furnaces, kitchen ranges, etc., are overhauled, coils and waterbacks for hot faucet supply (which were never quite satisfactory—never well balanced with the other work of the fire) are often found "played out".



An independent hot water service is the acme of household convenience.

Just the time to provide house-owners with permanent, independent IDEAL Water Heaters, and make a few satisfied customers. We make 4 lines suitable to all domestic needs. Write any branch for circulars, prices etc.

AMERICAN & IDEAL
RADIATORS BOILERS

AMERICAN RADIATOR COMPANY

General Offices: 282-284 Michigan Avenue, Chicago.

New York, 104-108 West 42d Street.
Boston, 129-131 Federal Street.
Philadelphia, 1342 Arch Street.
Baltimore, 109 E. Lombard Street.
Buffalo, Court and Franklin Streets.
Pittsburg, 601-603 Hartje Building.
Cincinnati, 213 W. Fourth Street.
Cleveland, 710 Prospect Avenue.
Chicago, 282-284 Michigan Avenue.
Milwaukee, 126 Sycamore Street.
Indianapolis, 511 Lemcke Building.
Detroit, 225 Jefferson Avenue.
St. Louis, Olive and Fifteenth Streets.
Atlanta, 11 North Forsyth Street.
Omaha, 413-417 South Tenth Street.
Minneapolis, 229 Fifth Street, South.
Kansas City, 313 East Tenth Street.
Denver, 831 Fifteenth Street.
Seattle, 1215-1216 Alaska Building.
San Francisco, Monadnock Building.
Brantford, Ont., Market Street.

Houston, Texas.—Barber Plumbing Company has been incorporated with a capital of $10,000. The incorporators are M. C. Barber, Charles R. Brace, Henry W. Warren and R. H. Gill.

Fond du Lac, Wis.—Frank W. Kramer and Wm. A. Kramer have formed a partnership under the name of Kramer Bros., and engaged in the plumbing business in the Land block on South street.

Brooklyn, N. Y.—The Kings County Plumbing Company has been incorporated with a capital of $5,000. The incorporators are T. R. Delacey, of New York City; S. E. Blake and J. T. Blake, of Brooklyn.

Chicago, Ill.—A. E. Weinberg, for some years conducting a plumbing business at 569 East Thirty-first street, has opened an attractive shop at 1018 East Fifty-first street, which he will run as a branch of his former place.

BUSINESS CHANGES

Liberty, Mo.—The dissolution is reported of the plumbing firm of Lippert & Magill.

Chillicothe, Mo.—B. B. Stevens has purchased the plumbing business of B. S. Wheeler.

Ft. Morgan, Col.—The dissolution is reported of the plumbing firm of Leach & Schooley.

Lincoln, Neb.—C. D. VanHorn has succeeded to the business of the VanHorn Plumbing Co.

Albuquerque, N. M.—Isaac Cox has retired from the Standard Plumbing and Heating Company.

Duluth, Minn.—The American Heating Company has certified to an increase in capital stock to $30,000.

Pekin, Ill.—P. J. Kelley has succeeded to the plumbing business formerly conducted under the name of Kelly & Kraft.

Ashtabula, O.—It is reported that the plumbing firms of Paine Bros. and G. H. Ford & Co. have been consolidated.

Mason City, Ill.—J. L. Robertson has moved his plumbing establishment to the Ellsberry building on South Main street.

Chelsea, Mass.—The plumbing firm of Geo. H. Foster & Son has purchased the plumbing business formerly conducted by Henry Gorton.

Canton, O.—The plumbing firm of W. D. Theobald & Son is reported to have been succeeded by the Chapman Plumbing and Supply Company.

Harrison, N. J.—W. H. Godby & Bro. have moved their plumbing and heating business into a new building, which they had erected at 424 William street.

Fayette City, Pa.—Brown & Ferris have moved their plumbing business from the McCune building to larger quarters at the corner of Cook and Second streets.

Fort Wayne, Ind.—Frank Weaver, who has conducted a plumbing business on Baker avenue for several years, has purchased an interest in the plumbing business of John F. Schwegman.

Odessa, Wash.—The Odessa Mercantile Company has succeeded to the plumbing business of L. S. Ferguson, who will be associated hereafter with this firm as manager of that department.

Elgin, Ill.—The plumbing business of Taylor & McGuire, it is reported, has been dissolved, both gentlemen retiring. Mr. McGuire contemplates moving to the southwestern portion of Kansas.

Beloit, Wis.—The Sanitary Plumbing Company has moved into new and larger quarters in the Nellie Smith building on State street. The company is composed of J. R. Williams and A. C. James.

Marion, Iowa.—D. B. Palmer, of the plumbing firm of Sebern & Palmer, has sold his interest in the business to his partner, W. P. Sebern, who will conduct it under the name of the Sebern Plumbing Company.

Braddock, Pa.—Edmunds & Williams, contractors of plumbing and heating, and dealers in hardware, at 611 Braddock avenue, have dissolved partnership. A division is also to be made in the business, W. H. Williams assuming the ownership of the plumbing and heating end of the business, while his former partner, Richards W. Edmunds, will assume control of the hardware and gasfitting portion of the business. Mr. Edmunds will continue at the old stand, as will Mr. Williams, for the present, until he secures another location, when he will move his part of the business.

CONTRACTS AWARDED

Crookstown, Minn.—Chas. F. Brennan was low bidder on the plumbing work to be installed in the new Tom Morris building.

Minneapolis, Minn.—The Pond & Hasey Co. has been awarded the contract for the heating work in the new Pillsbury school.

Sewickley, Pa.—The plumbing contract for the Sewickley Valley Hospital has been awarded to John Patton, Jr., of this city.

East Chicago, Ind.—E. Pickard has contracted for the plumbing in several new structures under course of erection in this place.

Pittsburg, Pa.—A new firm has engaged in the plumbing and heating business at West Liberty under the style of L. Shumaker & Bro.

Watertown, S. D.—The Downey & Kruse Co., of Milwaukee, has been awarded the contract for the heating plant in the new city hall.

Minneapolis, Minn.—The Tunstead Heating Company has the contract for the installation of the heating plant in the new Columbus school.

Minneapolis, Minn.—The Archambo Heating Company has been awarded the contract for the heating installation in the new Simmons school.

Newark, N. J.—Archibald MacArthur, of Kearney, has been awarded the contract for the plumbing in School No. 8. The consideration is $3,694.

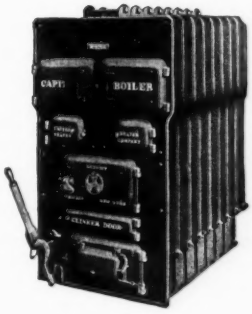
Iola, Kan.—William Root, of this city, has secured the contract for the plumbing in the new college building at Enid, Okla. The consideration is $2,500.

Carthage, N. Y.—Balmat & Brayton have been awarded the contract for the plumbing and heating in the annex to the Wanakana house at Cranberry Lake.

A Pointed Talk

CAPITOL BOILERS AND RADIATORS

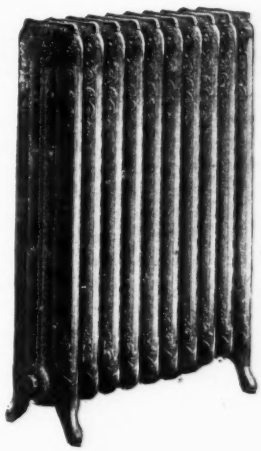
to Steam Fitters



In this brief space we can naturally only mention a very few of the good points and superior features of the Capitol Boilers and Radiators. To do real justice to them we want to send you our catalogue. It is a handsome and interesting book and you will be well repaid for writing for it.

CAPITOL BOILERS

are built in divided half sections. This makes a system of light, easily-handled units for the steam fitter in installing same. It makes installation easy and quick; saves the steam fitter's time, hence saves him money.



If entrance to basement is small, there is no need to tear away a section of the wall; the Capitol can be taken in by sections and set up inside the basement.

These half sections are connected with the header or steam dome by means of a system of push nipples that under the severest conditions has proven thoroughly reliable and trustworthy.

The steam dome itself is countersunk thereby saving much room and enabling the Capitol to be set up in basements with low ceilings. The mains or flow pipes are connected only to the steam dome—they do not tap the individual sections.

The Capitol Boiler is built of cast iron and it is now the opinion of disinterested engineers that cast iron is superior to wrought iron or steel for this purpose. Ratings we give on our Boiler are conservative and honest—you may rely upon them implicitly.

Capitol Radiators contain the full area of prime heating surface claimed and every inch of heating surface has been utilized in the most scientific manner. Our Puritan and Florentine designs are artistic enough to please the most exacting tastes.

But write for our catalogue today; it tells and illustrates every capital point about the Capitol Boiler.

United States Heater Company

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SALES AGENCIES:
BOSTON, MASS., J. H. Cunningham & Co.
DENVER, COLO., Kellogg & Stokes Stove Co.
MINNEAPOLIS, MINN., Plumbing & S. F. Supplies Co.

Chickasha, Okla.—A. F. Bock has been awarded the contract for plumbing and heating the new Paulson Hotel at El Reno, Okla. The consideration is $4,200.

Austin, Ill.—The Modern Plumbing Company, of 5619 Madison street, has contracted for the plumbing in sixty new houses in Oak Park for Gunderson & Sons.

Gibsontown, Pa.—The contract for remodeling the entire plumbing system in Henry Daly's fine residence has been awarded to Regan & Hormell, of Charleroi, Pa.

Oconomowoc, Wis.—N. Norlberg has been awarded the contract for the plumbing in the new sanitorium being erected here by the Oconomowoc Health Resort Co.

Zanesville, O.—The Roekel Plumbing Company has been awarded the contract for the plumbing, heating and sewerage work in the new First National Bank building.

Fayette City, Pa.—Brown & Ferris have been awarded the contract for the plumbing in the new building for the Young Men's Christian Association in this place.

Des Moines, Iowa.—Wallace & Linnane, of 715 Walnut street, have been awarded the contract for the plumbing and heating work in the new Dallas County court house.

Milwaukee, Wis.—The N. Treis Heating Company has the contract for the heating installation in the House of Correction. Wenzel & Holst have secured the plumbing work.

SAN FRANCISCO

San Francisco, Cal.—The floods are now over and the plumbers are at work everywhere. In this city the last few days have been clear and bright and building has been resumed on a large scale throughout the city. One bad effect of the high water still remains. This is the making of a bad matter worse in the case of the railroads. Even before the storms blocked the railroads of the state by means of landslides and washouts, the delivery of eastern freight required from sixty to ninety days and now the length can only be guessed at. Now the jobbers of supplies find themselves hit in both directions. They can hardly get in any shipments from the east and, on the other hand, they cannot ship out to a large extent of their territory. The railroads will not receive freight for shipment to the greater part of Northern California, for Nevada or for Utah.

Local master plumbers are now beginning to think of the next annual meeting of the state association which will meet at San Diego within a few weeks. It is hoped that a considerable delegation will attend from this city, though the rush of work in San Francisco and the many complications that are continually arising as a result of the unsettled conditions, shortage of stock and of labor, etc., will make many feel that they can hardly spare the time. Nevertheless, it is recognized that the meeting will be an important one and a number are certain to attend from San Francisco and Oakland.

K. A. Rivers is preparing to erect a lodging house at the corner of Dupont and California streets at a cost of $53,000.

D. S. Dorn has secured a permit for the erection of an eight-story Class A building to cost $173,000, on Powell street near Geary.

Ex-Mayor E. B. Pond has asked for a permit for a five-story reinforced concrete office building on the northeast corner of Mission and New Anthony streets to cost $74,500.

The new Y. M. C. A. building, which will be erected on the old site at the corner of Ellis and Mason streets, or at another location farther out, will cost approximately $500,000.

John R. Shehan & Co., contractors, have begun work on the ten-story Class A building for the Western Real Estate Company, at the corner of First and Market streets. The building will be fitted up for office purposes and will cost about $175,000 when completed, which will be before November 1 next.

* * *

Plans and specifications and estimates of cost for the construction of a new county court house for the county of Sacramento will be received by the board of Supervisors at Sacramento until April 22. The sum of $400,000 is available for the construction of the building.

The Portland, Ore., building situation has been seriously affected by the strike at the lumber mills in that vicinity. During the greater part of last week builders were without lumber to a great extent and, though this is now somewhat relieved, there is still much uncertainty.

FINANCIAL TROUBLES

Dublin, Ga.—It is reported that H. M. Kirke, a master plumber, has filed a petition in bankruptcy.

Berkely, Cal.—It is reported that F. T. Eisenhuth, a master plumber in this city, has filed a petition in bankruptcy.

Corsicana, Tex.—T. S. Brooks, proprietor of a machine shop and a plumbing business, has filed a petition in bankruptcy. His liabilities are not given and his assets are placed at $6,000.

Little Rock, Ark.—The business of the Little Rock Heating Company was sold under order of the chancery court on Thursday of this week by J. A. Trawick, receiver of the company.

Baltimore, Md.—An involuntary petition in bankruptcy has been filed against the Maryland Plumbing and Tinning Company, of 27 West Biddle street. Samuel K. Smith has been appointed receiver.

Buffalo, N. Y.—Joseph Kulinski, proprietor of the plumbing establishment of Kulinski & Odien and Kulinski & Co., has filed a petition in bankruptcy. His liabilities are scheduled at $4,782.41, and his assets at $200.

Boston, Mass.—Bessie M. Davis, of 17 Birch street, Roslindale, who for years has held the distinction of being the only woman plumber in the state of Massachusetts, has filed a petition in bankruptcy. Her petition reveals liabilities of $423 and but $46 in assets. She styles herself the "proprietress of a plumbing business."

We do not fill our reading columns with puffs and write-ups. Our subscribers pay for reading matter and they get it straight. But our advertising pages contain the cream of the trade's offerings and repay study. In writing advertisers please mention Domestic Engineering.

PATENTS

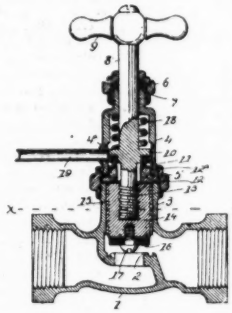
846,275. **Valved Outlet for Waste and Overflow Pipes.** David W. York, State Farm, Mass.

846,370. **Hot-water Heater.** Edwin F. White, Hollidaysburg, Pa., assignor of one-third to Edward H. L. Page, Hollidaysburg, Pa., and one-third to Robert Lee Walker, Duncansville, Pa.

846,472. **Heating-boiler.** Charles L. Holden, Indianapolis, Ind.

846,506. **Continuous Heating-furnace.** Harry Parrock, Youngstown, and Willis McKee, Elyria, Ohio; said Parrock assignor to said McKee.

843,496. **Compression Stop and Waste.** Anton C. Schuermann, Decatur, Ill., assignor to H. Mueller Manufacturing Company, Decatur, Ill., a corporation of Illinois.



846,600. **Water-closet Bend.** Ben Oakes, Detroit, Mich.

846,704. **Pipe-coupling.** Henry S. Stucy, Louisville, Ky.

846,713. **Hose-rack.** Charles Wright, South Greensburg, Pa., assignor to J. A. Binkey, Greensburg, Pa.

846,712. **Tank-valve.** Charles Wright, South Greensburg, Pa., assignor to J. A. Binkey, Greensburg, Pa.

846,780. **Cut-off for Faucets.** John W. Collins, Washington, D. C.

846,929. **Waste-pipe Connection for Closet-bowls.** Henry J. Luff, Cleveland, Ohio, assignor to Charles N. Fiscus, Cleveland, Ohio.

Books.

LAWLER'S MODERN PLUMBING. Covers both plumbing and heating. One of the most practical works ever written. 400 pp., 7½x10 inches, 187 illustrations. Extra cloth, $5.00. DOMESTIC ENGINEERING, Chicago.

SANITARY ENGINEERING OF BUILDings, by W. P. Gerhard, C. E. The latest and most comprehensive treatise on the sanitary equipment of dwellings. Defective plumbing and inadequate drainage and sewerage treated. Approved and thoroughly tested methods described. 454 pp., 103 illustrations, 7x10 inches. Cloth, $5.00. DOMESTIC ENGINEERING, Chicago.

PLUMBING CATECHISM, OR THEORY and Practice of Plumbing Design. By Charles B. Ball, M. Am. Soc. C. E., and M. Am. Soc. Inspectors of Plumbing and Sanitary Engineers, and Herbert T. Sheriff, A. B., some-time Editor "Domestic Engineering." Mem. Am. Plumbing and Sanitary Engineers. Bound in cloth; 6¾x4¾; 100 pp.; elaborately indexed. $1.00. "Domestic Engineering," Chicago.

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Advertising—Copy and cuts for advertisements should be received by the last day of the week preceding publication. We cannot guarantee insertions or changes in advertisements if received later.

Entered in the Postoffice in Chicago, Illinois, as mail matter of the second class, Dec. 12, 1901.

April 6, 1907

Classified Advertisements

The rate of advertising under this heading is 10 cents a line an insertion. The average advertisement runs six words to a line. To insure insertion in this column copy should be received not later than Wednesday afternoon.—One man from Opelika, Ala., writes under date of January 18, 1907: "The litle ad I had in Domestic Engineering on the 12th inst. has brought me 27 inquiries up till today. I consider it the best magazine that ever went into any office."

Help Wanted.

WANTED—JOURNEYMAN PLUMBERS to work in open shop. Wages, $4.00 a day, 8 hours. Steady work. Address Simmons & Young, Mobile, Ala. 4-13

WANTED — PLUMBER; GOOD MECHANIC; man of good character; temperate; steady job every day in the year. Address Barrett Hardware Co., Joliet, Ill. 4-13

WANTED—SALESMAN TO CARRY A first class ball cock as a side line; a ready seller and gives satisfaction; state what territory you cover. No. 619, "Domestic Engineering," Chicago. tf

WANTED—A GOOD ALL ROUND MAN for plumbing and hot water heating establishment; man with steady habits and good character. No others need apply. Buck & Boyd, Vincennes, Ind. 4-6

WANTED—FOR SALESMAN IN INDIana and Illinois, young man familiar with plumbers' supplies; must have experience. State age, references and particulars. No. 667, "Domestic Engineering," Chicago. 4-6

WANTED—OFFICE MAN CAPABLE of handling correspondence and sales of heating and steam supplies, etc. Location, Chicago. Great opportunity for a hustler. State salary expected. No. 668, "Domestic Engineering," Chicago. 4-13

WANTED—IN THE CITIES OF PITTSburg, Detroit, New Orleans, Birmingham, Ala., San Francisco and Cincinnati, jobbers or manufacturers' agents on commission to handle a full line of steam gauges and steam specialties. No. 666, "Domestic Engineering," Chicago. 4-6

EASY MONEY FOR SALESMEN CALLing on plumbers in all lines, selling a rattling good specialty. One which will not conflict with line you may now be selling. Sample weighs less than 2 ounces and can be carried in vest pocket. A handsome proposition and easy to sell. No. 647, "Domestic Engineering," Chicago. tf

Situations Wanted.

HEATING AND PLUMBING SUPERintendent and estimator wants position after May 1st; thoroughly experienced; references. No. 661, "Domestic Engineering," Chicago. 4-13

WANTED—A THOROUGHLY COMPEtent accountant and credit manager desires a position with either jobbing house or large plumbing establishment; best of references. No. 665, "Domestic Engineering," Chicago. 4-6

For Sale.

FOR SALE—NEW GALVANIZED VERtical range boiler with steam coil; 144 gal.; 6 ft. by 24 in. J. C. Bixby & Son, Council Bluffs, Ia. tf

FOR SALE—PLUMBING AND HEATing business; stock can be reduced to suit purchaser. Reason for selling, have made a competency. Will rent building now occupied if desired. For particulars address J. Z. Royer, Rockford, Ill. tf

FOR SALE—A LONG ESTABLISHED branch in the plumbing, steam, roofing and tinsmithing business in the best part of the Bedford Section of Brooklyn; only $300 required. J. B., 1226 Sterling Pl., Brooklyn. tf

FOR SALE—WELL ESTABLISHED plumbing and heating business in one of the largest cities in northeastern Ohio. Ill-health reason for selling. Business about $50,000 a year. No. 659, "Domestic Engineering," Chicago. 4-13

Plumbing Schools.

PLUMBING SCHOOL — WE TEACH you in few months that which requires years by the apprenticeship method. Free catalog and full information. Plumbing School, Minneapolis, Minn.

EARN $5 A DAY—LEARN TO BE A plumber in from 4 to 6 months on easy payments. For particulars address Master Plumbers' Trade School, 3402 Lindell Ave., St. Louis, Mo.

Books

AMERICAN SANITARY PLUMBING, by Jas. J. Lawler. The Science and Mechanics of Plumbing handled in a practical way. 307 pp., illustrated. Cloth, $2.00. DOMESTIC ENGINEERING, Chicago.

AMERICAN PLUMBING PRACTICE. Just the book to help ambitious plumbers develop their trade from cheap to high grade work. 260 pp., 8x11 inches. 536 illustrations. Cloth, $3.00. DOMESTIC ENGINEERING, Chicago.

HEATING AND VENTILATING BUILDings. A Manual for Heating Engineers and Architects, by Rollo C. Carpenter, M. S., C. E., M. M. E., Professor Experimental Engineering Cornell University. New and enlarged edition. 562 pp., 277 illustrations. Cloth, $4.00. DOMESTIC ENGINEERING, Chicago.

LADD'S DISCOUNT BOOK. 200 TAbles, 120,000 computations. Covers the whole range of discounts, both simple and complex. Results all figured out for you ready for use at a glance. You need it in invoicing, in setting prices and in making inventories. $4.00. DOMESTIC ENGINEERING, Chicago.

CONTRACT AND ESTIMATE RECORD Book, for Steam and Hot Water Heating, by B. H. Jessup. A much needed book. Every item for estimates on steam and hot water heating is listed, with parallel columns for entering the cost. Alphabetical index for names of parties to whom estimates are furnished. Accurate, business-like, prevents losses. 200 pp., 7x12 inches. Cloth, $1.50. DOMESTIC ENGINEERING, Chicago. tf

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Bullard Automatic Wrench Co., Providence, R.I.

Buyers' Ready Reference List

Expansion Bolts.

STAR EXPANSION BOLT CO., 147 CEDAR St., New York City. Manufacturers of Expansion Bolts in Iron, Brass and Lead. Star Screw Anchors (Lead) are indispensable to Plumbers.

Couplings.

W. I. COUPLINGS; BLACK, GALV., LINE Pipe and Hydraulic. The A. & J. Mfg. Co., 26 W. Randolph St., Chicago, Ill.

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E. BAGGOT CO., 169 ADAMS ST., CHICAGO, Ill. Makers of Gas Fixtures and Fittings.

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CHAS. MILLAR & SON CO., UTICA, N. Y. Superior quality Cast Iron Gas and Water Pipe, Cast Iron Soil Pipe and Fittings, Cast Iron Screwed Fittings.

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AMERICAN STEAM PUMP CO., BATTLE Creek, Mich. Makers of Marsh Steam Pumps for hot and cold water.

Traps, Steam.

THE ALBANY STEAM TRAP CO., ALbany, N. Y. Improved Return Steam Traps. Practicability and efficiency.

Water Closets.

K. V. A. CLOSET TANKS AND SEATS. None better made. Knott-Van Arnam Mfg. Co., Fort Wayne, Ind.

THE R. C. McCLURE CO., SYRACUSE, N. Y. Mfrs. of the very highest grade of Water Closets. Send for booklet.

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FIFTY PLUMBING CHARTS SHOWing how modern, up-to-date, sanitary plumbing should be done in different kinds of buildings. Paper bound, 9x5¾ inches; 50 pp. Price only 25 cents. "Domestic Engineering," Chicago.

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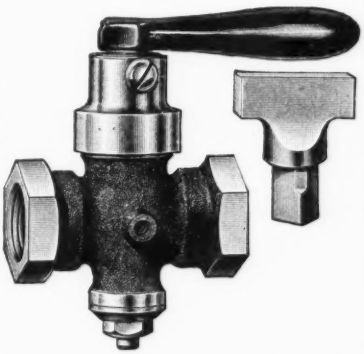

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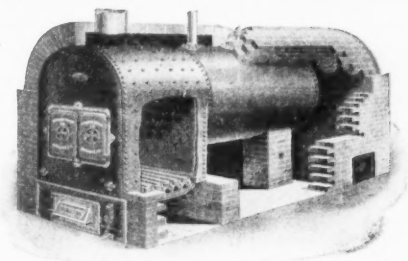

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Toledo Pipe Threading Machine Co.....vi
Trenton Brass & Machine Co.....
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*Wolverine Brass Works..... —
*Wood Mfg. Co., John..... —
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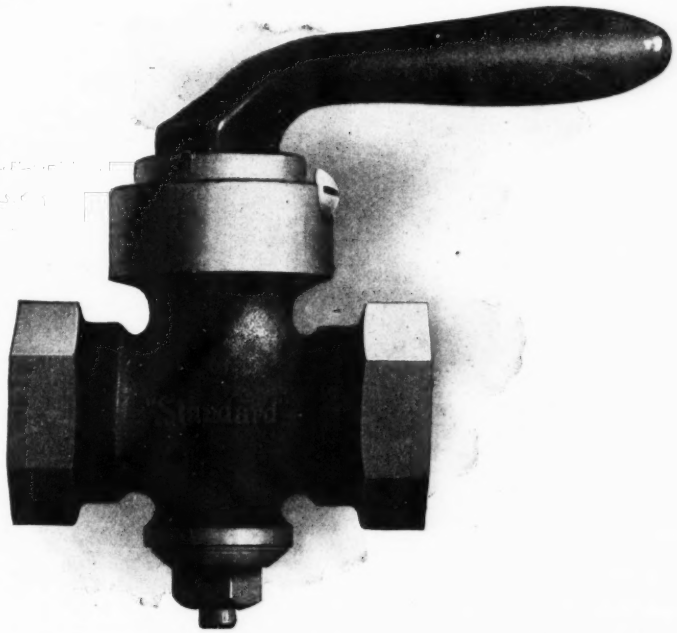
"Standard"

Patented Stop and Waste

The **"Standard"** Stop and Waste is guaranteed to be the most reliable Stop and Waste manufactured. It is of extra heavy red metal and every cock is tested to 250 pounds pressure. It bears the trade mark **"Standard"** which appears on all items of our manufacture, and which is a full guarantee of quality.



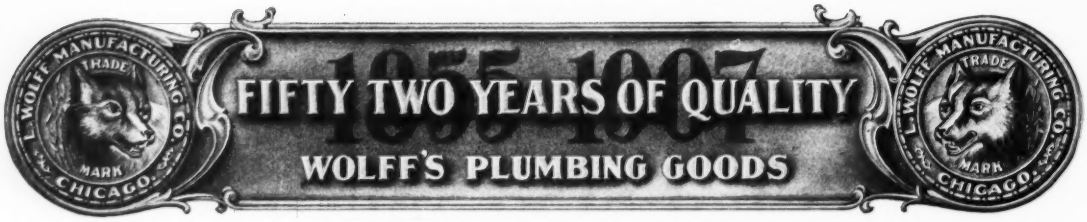
Sizes	½ in.	⅝ in.	¾ in.	1 in.
Rough Stop and Waste, price per dozen	$19.00	$24.00	$28.00	$41.00
Finished Stop and Waste, price per dozen	23.00	29.00	34.00	49.00

Our facilities for producing **"Standard"** Brass Goods have recently been much increased, and we are now able to execute with promptness orders for Compression and Fuller Bibbs and Basin Cocks, Compression and Fuller Double Bath Cocks, Ground Key Work and our Special Basin Cocks, Bath Fittings, Lavatory and Sink Fittings, Basin and Bath Supplies, also **"Standard"** High Grade Shower and Needle Baths.

The trade mark **"Standard"** on brass goods is a guarantee of first quality. If you insist on having goods bearing the **"Standard"** trade mark, you will secure the best in their respective lines.

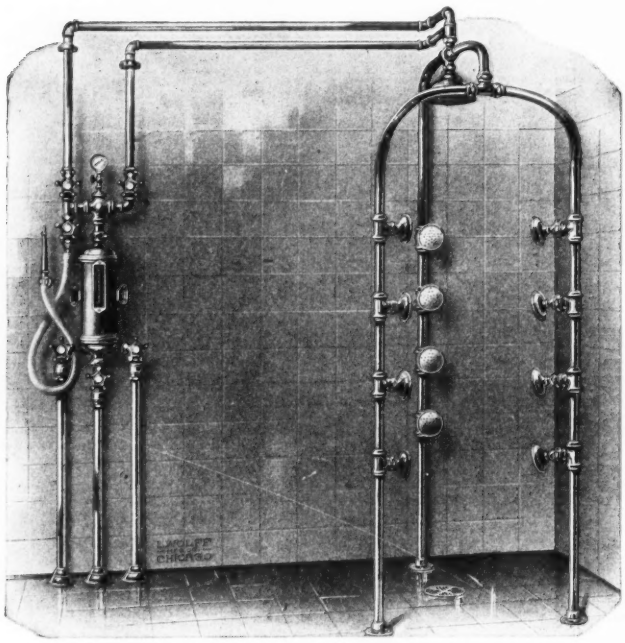
Standard Sanitary Mfg. Co.

PITTSBURGH, U. S. A.



Wolff's Nickel Plated Brass Hospital Shower and Needle Bath

EXTRA HEAVY CONSTRUCTION



All our make of Needle and Shower Baths bear our Diamond Shaped Blue and Gold Name Plate.

The Department of Hospital Plumbing equipment of the L. Wolff Mfg. Co. controls many new ideas and manufactures a large line of special fixtures that will be of interest to architects designing hospital work. The expert services of this department of our business may be called into consultation on any of the sanitation problems of hospital or institution building.

L. WOLFF MANUFACTURING CO.

ESTABLISHED 1855

MANUFACTURERS OF PLUMBING GOODS EXCLUSIVELY

THE ONLY COMPLETE LINE MADE BY ANY ONE FIRM.

SHOW ROOMS, 91 DEARBORN STREET

DENVER CHICAGO TRENTON

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

"Leak Stopper" Cement

WHAT WE CLAIM IT WILL REPAIR

SAND HOLES in Boilers, Radiators, Fittings, Pipe and Castings, either of Iron, Brass, Copper, Lead or Block-tin.

BLOW HOLES in Castings of all kinds.

SETTING GLASS in Storm Sash, Skylights or Sidewalks, and Aquariums.

SETTING MARBLE Lavatories, Tombstones, Shower Baths and Soda Fountains.

SETTING PORCELAIN Lavatories, Bowls, Tubs and Urinals.

GASKETS of all kinds under high and low pressure.

CONNECTING LEAD PIPE to Iron, Brass, Lead, Glass or Block-tin Pipes.

REPAIRING Range Boiler Bushings that seap, Bursted Pipes, Leaky Closet Spuds that are broken out, and cracked sections of sectional Boilers. For Slate sinks it is a "dandy."

IT WILL STICK to Copper, Tin, Wood, Lead, Iron, Steel, Glass, Marble, Porcelain or Slate.

IT SETS very quickly and for that reason must be worked rapidly, for it is worthless after it has once set.

It requires from one to three hours to set, owing to the nature of the repair. On warm pipes it will set more rapidly.

IT HAS, like all other really good things, its imitators and "just as goods," with the same old song, "Less money."

IT CONTAINS mercury, which when properly applied, forms a substance almost like the iron itself and will contract and expand with the iron, thus making a perfect plug or stopper that will not blow out.

Unconditionally Guaranteed

I guarantee this Cement to work in every case for which we recommend it, whether purchased direct from me or the Jobber, and in case of failure by the user to make it work, in any case and from any cause, I will upon written notice from the user, of such failure, giving the conditions and nature of the repair, give him written instructions as to the proper application of the cement, as applied to the case in hand, when if it fails to work as I claim in every particular, the user being the judge as to whether it does or not, I will give him written instructions as to the disposition or return of what may be left of the cement, which shall be at my expense and that I WILL RETURN TO HIM $3.00 HE PAID FOR IT. When goods purchased from a Jobber are to be returned, a receipted bill from such Jobber must accompany the claim that proper credit may be given.

Booklet on Request

Winslow D. Jennings

NEW CASTLE, INDIANA

WINSLOW D. JENNINGS, New Castle, Ind., Gentlemen—In view of your guarantee, printed in Domestic Engineering of April 6, 1907, I enclose check, $3.00, for one package "Leak Stopper" Cement.

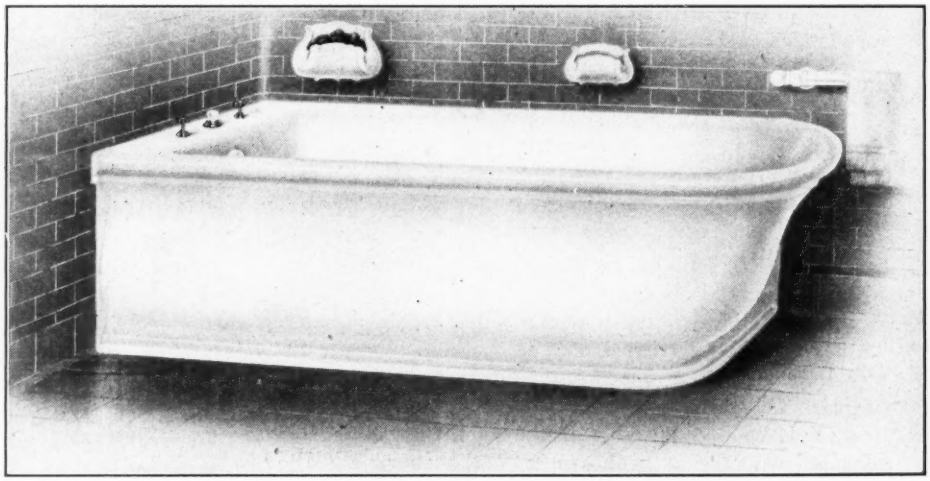
Name_____

Street_____

City_____

The Trenton Potteries Company

New Style "Seville" Bathtub—"Ideal" Solid Porcelain Ware



This Bathtub is of the French Style with one rounded end and the other end and back tiled into wall. The fittings are fastened in the tub as shown.

The Trenton Potteries Company

Trenton, New Jersey, U. S. A.

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

Mr. Plumber:

If you are looking for High Class Closets that is not high priced and one that will take care of YOUR interests as well as ours 365 days in each year. It is the famous

Hamilton Gem Closets

Built Right—Look Right—Work Right

They are made to suit your over particular customers

THE "KENMORE"

Specify your requirements on Linings, Copper, Lead or Re-Ma-Co, and any special measurements for Roughing In.

Every Hamilton Gem Tank has the **Reliable Ball Cock,** and we challenge the world to produce its equal. All pressures from 1 lb. to 250 lbs. look alike to it, no cup leathers, no close working parts, leverage 100 to 1, is the only compound supply valve made where the plunger is centered with a pin on the bar, seats square and true every time, has removable seat plate of phosphor bronze. Reliable Ball Cock can be used for repairs in any make of closet, high or low, for we make the thread, coupling and tail piece of the stem all sizes, just mention the size coupling or the name of closet you want it for.

Haven't had a single adverse criticism on the **Reliable Ball Cock,** each mail brings us duplicate orders and words of contented satisfaction. We will mail you for the asking, a list of Ball Cocks on the market showing the diameter and thread sizes.

The Hamilton Gem Low Tank Closets

MADE ONLY AT
Hamilton, O.
BY

The Sanitary Mfg. Co.

CUT **PIPE** RANDON

Valves and Fittings

Carried in Stock
By

GEO. B. LIMBERT & CO.

49-55 Fulton Street Chicago, Ill.

My Proposition Today

Confidence in the merits of one's Product, having an inestimable value in the marketing of goods, it is the wish of the maker of the "No Leak", Regulator, not only to show to the trade, the reliance which he places upon his article, but, by the following proposition, to disseminate that confidence, until the capable and reasoning plumber will be able to leave his work, with feelings of security and pride, hnowing that his customers will be suited and their fixtures remain intact.

TO ANY PLUMBER in the UNITED STATES, I will send one "No Leak" Regulator, on thirty days' trial, under any hydrostatic conditions known to exist. If at the end of that time, or before, he finds the valve unsuited to the purpose, or in any manner unsatisfactory, I will refund the purchase price, in addition to all expenses for material and labor to which he may have been put in placing the valve and taking it out. This is with the understanding that the Regulator is to be used only on **Water Service,** as the article is not designed or intended to be used upon **Steam, Air or Oil.**

HUGH MERRIE, 124 E. 8th St., Cincinnati, O.

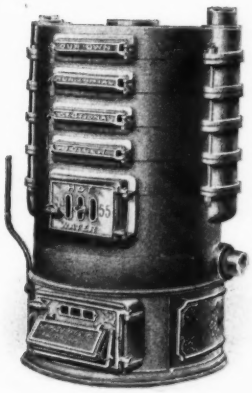
THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

"Our Own"

BOILERS

Steam or Hot Water

PRIME
EFFECTIVE
SELF-CLEANING
HEATING
SURFACE



NO
SEDIMENT
OR SCALE ALLOWED
TO LODGE
IN TUBES

Taper push nipples in making all joints. The most satisfactory boiler on the market.

YOUR OWN NAME ON THEM
That's What Counts

Car load orders, three days' notice. Smaller shipments, promptly. We carry a full line of Radiators, Steam and Hot Water Supplies and Specialties for immediate demand.

START THE SEASON RIGHT
See Coupon

Western Plumbing Supply Company
20-22 Desplaines Street, CHICAGO, ILL.

Western
Plumbing
Supply Co.
Chicago, Ill.

Gentlemen:—I will start the season right if you will mail your catalogue and other literature, also a useful advertisement which will help me in my business, free of expense to my business address:

Name_____

Street _____

City _____

REMOVAL NOTICE

About July 4, 1907

we will move to larger and more conveniently located quarters in our own building, now under erection, at the corner of Lake and Desplaines Street, Chicago, where we will carry in stock the most complete line of Sanitary Plumbing Fixtures, Water, Gas and Steam Supplies, and try to merit a continuance of your confidence by improving our system in every way possible.

WEIL BROS.
15 North Clinton Street, Chicago

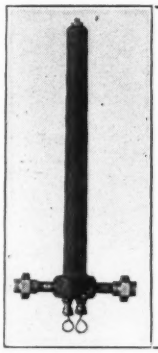
SHIRLEY

SHIRLEY PIN INDIRECT RADIATORS
are made in 12 feet and 20 feet sections

WE MAKE A COMPLETE LINE
Plain and Ornamental Radiation

Shirley Radiator & Foundry Co., Indianapolis, Ind.

RADIATORS



PATENT FURNACE WATER HEATER

This heater can be installed in any furnace without disturbing the fire. Will furnish sufficient water for ordinary domestic use. Easily connected and after once installed can be removed and replaced in 30 minutes. Equipped with brass rods to remove all deposits. Made in three sizes.

GATES & FOX
419 E. 16th Street Indianapolis, Ind.

Century Engraving Co.

T. VAN HOUSEN, Manager

NEGRAVERS

TO

DOMESTIC ENGINEERING

166 South Clinton Street, Chicago, Ill.

Simpson, Bevans & Co.

Electrotypers

Special attention given to out-of-town trade. Prices on application.

Telephones: Main { 4757 / 4777

164-170 South Clinton Street, Chicago, Ill.

The Lewis Power Washer

"Let the water do the work." A washing machine operated by city water pressure. Saves labor, time and money. Sold under a guarantee, by dealers only. Write for prices and terms.

THE MONARCH Manufacturing Co.

Manufacturers of Lewis Power Washers Monarch Water Motors, Monarch Water Lifts, Monarch Stop & Waste and plumbers supplies.

118 VINE STREET. COLUMBUS, OHIO

FIFTY CHARTS

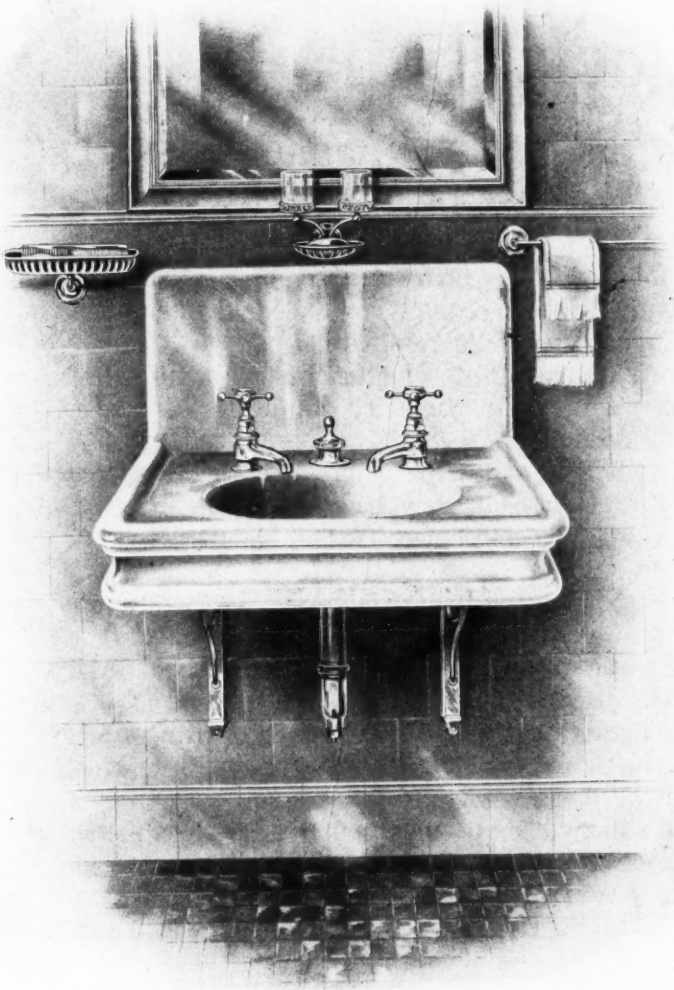
Showing how Plumbing should be done

Shows every fixture, trap, ferrule, joint, pipe, vent, with proper sizes, material and distances, for every kind of a plumbing job. Great aid in estimating. Shows customers how plumbing should be done and why it costs more than making woodboxes. A new edition for 25 cents by mail prepaid. Never before has this edition sold for less than $3.50.

DOMESTIC ENGINEERING
49-53 North Jefferson Street, Chicago, Illinois

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

Effectively Simple



This is Plate K 5 of our sanitary vitreous china lavatory with slab and bowl in one piece and back in another. We are pleased to send you our catalogue showing numerous other designs of lavatories.

THE GREAT WESTERN POTTERY CO.

KOKOMO, INDIANA . TIFFIN, OHIO

The Way to Tell The "Genuine" Murdock Hydrant

is to see that the full name "Murdock" is cast on the stock thus ☛

Perhaps you have been under the impression that your Supply House has been sending you "Genuine" Murdock Hydrants right along on your orders?

Have you ever thought to see whether you have been getting the *real thing* with the full name cast on the stock or simply "**M**"asquerader **HYDRANTS** said to be "just as good"? Plumbers, laboring under the impression that they are getting the same Hydrants they have bought in the past, write us asking why the screws (for example) "wear out so quickly now-a-days".

We ask them if the full name "Murdock" is cast on the stocks of the Hydrants that have given them trouble. The answer is invariably **"NO, BUT THE DEALER SAID THEY ARE JUST AS GOOD".**

It is in the **little things** which go to make up the perfect working and lasting qualities that the "Genuine" excels. We make the brass-work for our Hydrants in our own Brass Works and will not risk our reputation by cheap metal. Don't accept imitations—It is like looking for trouble. There is no reason why your Supply House cannot send you **Genuine Murdock Hydrants** and it will—**if you insist.**

SOLE MAKERS

The Murdock Mfg. & Supply Co.

WHOLESALE

PLUMBING, GAS AND STEAM SUPPLIES

PROPRIETORS OF
AMERICAN BRASS WORKS
GENERAL BRASS FOUNDERS AND MANUFACTURERS OF PLUMBERS' SPECIALTIES

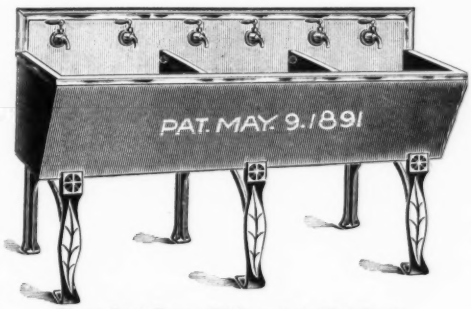
Cincinnati, O.

EASTERN AGENT
THOS. H. HUTCHINSON
101 BEEKMAN ST.
NEW YORK

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

THE ELSMERE TRAY

is by far the best Laundry tray ever placed on the market. These tubs are superior to all others in workmanship, durability, strength, cheapness and beauty.



Three Part Tray, With 6 Inch High Back. All One Piece.

Our new color and finish makes it imposible to distinguish the Elsmere Granitine Tray from the Soapstone, but the Granitine is superior to the Soapstone from the fact of its being cast in one piece without joint or seam. Thus affording no place for germs or dirt to settle. We wish **ESPECIALLY** to emphasize the fact that there are more **Granitine** Wash Trays in use in the United States than all other Trays combined, and that THE ELSMERE GRANITE CO. are not only the **LARGEST** Manufacturers of Granite Wash Trays in the **WEST** but their goods have given far better satisfaction than those of other manufacturers. This fact having been thoroughly established.

Write us for prices small lots or car loads.

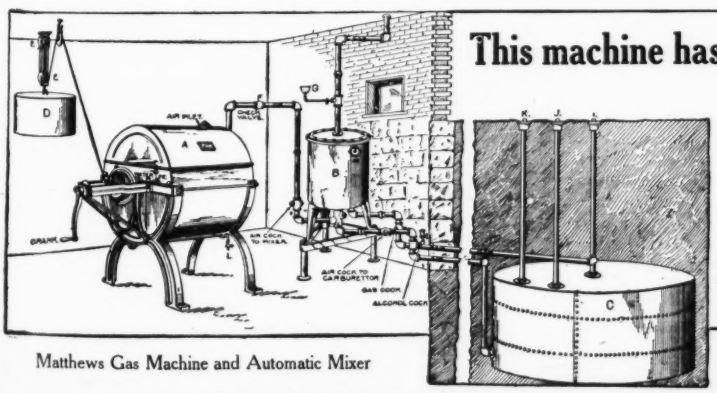
THE ELSMERE GRANITE COMPANY

947-951 North Spaulding Ave. CHICAGO, ILL.

MORRISON & KRETSCHMER MFG. CO.

OF DUBUQUE, IOWA

desire to enlist the attention of the trade in their manufacture of Morrison Low-down double flush Closets, Bath and Lavatory fixtures. Will be ready to supply the trade about May 1st, 1907.



Matthews Gas Machine and Automatic Mixer

This machine has made gas thirty years at ¼ cent per hour

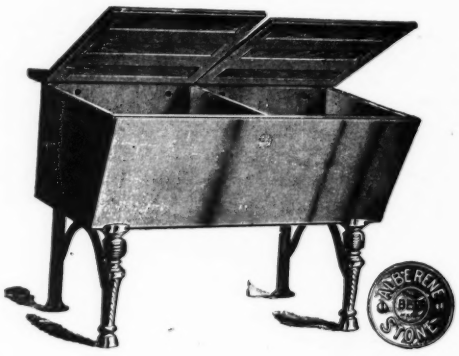
per 80 candle power. Makes gas for lighting, cooking and fuel.

Matthews Gas Machine Co.
40 Dearborn Street, Chicago

WRITE FOR OUR PROPOSITION

JUST AS GOOD

is an expression often used by our competitors when trying to sell their Slate and Cement against



ALBERENE STONE

Laundry Trays

AND

Kitchen Sinks

Our catalogue tells you about them. A postal brings it.

ALBERENE STONE CO.

54-60 North Clinton Street, Chicago, Ill.

MODERN WORKS

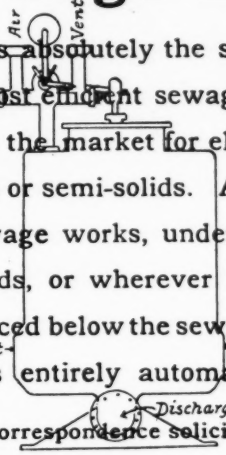
Quincy, Ill.

IRON WORKS

Quincy, Ill.

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXVI.

Ellis Improved Sewage Lift



This is absolutely the simplest and most efficient sewage ejector on the market for elevating liquids or semi-solids. Adapted to sewage works, underground railroads, or wherever fixtures are placed below the sewer level. Works entirely automatically.

Correspondence solicited

Geo. V. Ellis Sewer Lift Co.

274 Ninth Ave., New York City

NOXALL Jr.

GERM PROOF

FILTERS

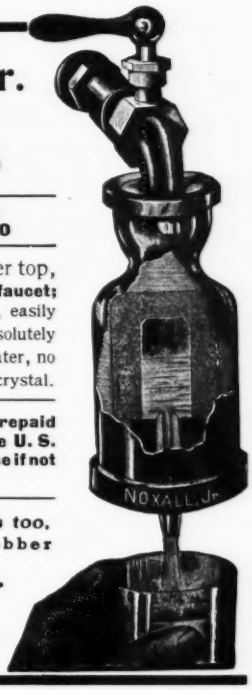
RETAIL FOR $2.50
Costs the Dealer $1.50

made with screw or rubber top, **to fit a hose bibb or plain faucet;** well made, beautifully finished, easily attached, easily cleaned, absolutely germ proof and makes any water, no matter how dirty, as clear as crystal.

We will send a sample by prepaid express to any dealer in the U. S. to be returned at our expense if not satisfactory.

We make bigger filters too.
We Do Not Sell The Jobber

American Filter Co.
508 Noxall Bldg.
MILWAUKEE, WIS

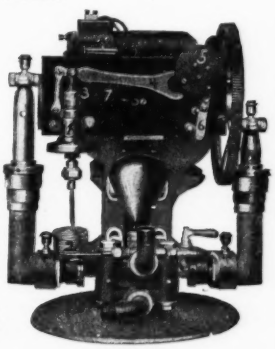


The Champion Hydraulic and Electric Water Lifts

Hydraulic

Hydraulic Water Lift for pumping soft water.

Entirely automatic and noiseless. Works when water is used; stops when consumption ceases. Requires no oil or attention. The best Hydraulic Lift on the market.



Electric

Electric Water Lift to Increase Water Pressure

in the upper stories of buildings where the city supply is not sufficient, or for pumping soft water. A compact and powerful pump. Entirely automatic. Made either for direct or alternating current.

The Champion Lifts are made of the best material and guaranteed to give satisfaction.

THE CLEVELAND FAUCET CO.

Cleveland New York Pittsburgh Chicago St. Louis San Francisco

Samples Free

to those who are interested in testing the best methods of connecting Radiation and Heating Boilers.

Zinc Coated Steel Slip Nipples are Rust-proof; impervious to distilled water; not affected by electrolysis; all true to size; elastic and adaptable to variation in boring castings.

The Pratt Chuck Co., Frankfort, N. Y.

BARRETT SPECIALTIES

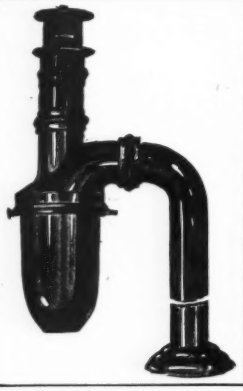
TIDEWATER AND SEWER TRAPS, O. D. BACK WATER VALVES, CLEANOUTS, GREASE TRAPS BARRETT SPECIAL FITTINGS. BRASS RAILING, IN ANY FINISH

JAMES BARRETT MFG. CO.

Manufacturers and Wholesale Dealers in Plumbers' Supplies

48-50 Pearl St. BOSTON 209-11 Franklin St.

Sewer and Tide Trap.



BOWER TRAPS

IMPROVED

are now manufactured exclusively by

THE MONARCH BRASS CO.

CLEVELAND, OHIO

AT A GREAT REDUCTION FROM FORMER PRICES

Send for catalogue and revised discounts.

HIGH CLASS GROUND KEY—COMPRESSION AND FULLER WORK
SOLDER NIPPLES AND UNIONS

Trap Screw Ferrules, Brass and Iron Body.

End Ferrules, All Sizes.

High Grade Plumbers' SUPPLIES

WRITE US FOR PRICES WHEN IN THE MARKET FOR
Ferrules — End Reducing or Trap Screw — Stop and Waste Cocks — Compression Work, Gas Goods, etc.

OUR GOODS WILL PLEASE YOU.
Send for Catalogue.

ERIE, PA. **J. B. CAMPBELL BRASS WORKS,** ERIE, PA.

MAIN OFFICE AND FACTORY KENOSHA

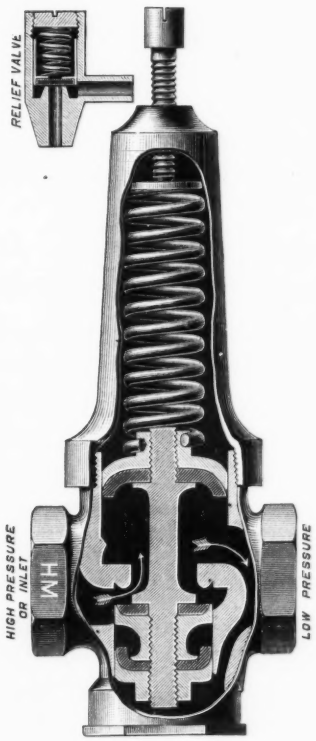
THE FROST MFG. CO.

PLUMBERS BRASS GOODS.

EASTERN OFFICE 547 E. 42 ST. NEW YORK

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

Mueller
Water Pressure Regulators



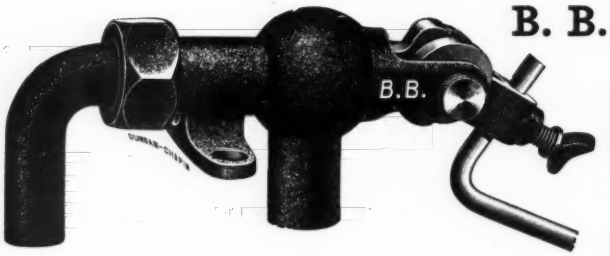
These regulators are made for service use up to 3 inch. Their few working parts being enclosed in a cap are safe against accident from the outside, and being made of brass are not hindered in their movement or weakened by corrosion.

THE MARK OF UNCONDITIONAL DECATUR H⊙M ILL. U.S.A. GUARANTEE MUELLER GOODS

H. MUELLER MFG. CO.

Works and General Offices
DECATUR, ILL., U. S. A.
West Cerro Gordo St.

Eastern Division
NEW YORK, N. Y., U. S. A.
254 Canal St., Cor. Lafayette



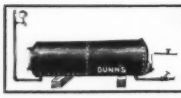
B. B. High Pressure Ball Cock

SIMPLEST AND BEST EVER MADE

All sizes ½ inch to 3 inches inclusive for Top, Bottom or End Supply and also for Low Down Tanks with special float. Removable seat of best steam metal. We are making floats stamped with our B. B. which are thoroughly guaranteed.

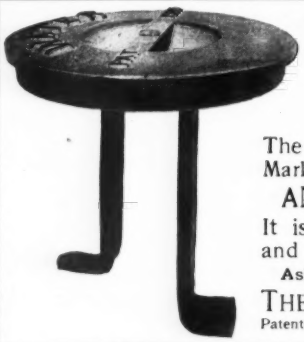
ASK YOUR JOBBER FOR THEM.

BOSTON BRASS COMPANY
36-40 Oliver Street, Boston, Mass.



DUNN'S PNEUMATIC SYSTEM OF WATER SUPPLY FOR COUNTRY HOUSES
We install in all parts of the world.
Dunn Machinery Co., Dept. 21, Atlanta, Ga.

FIFTY CHARTS showing how Plumbing should be done. Twenty-five cents. DOMESTIC ENGINEERING, 64 North Jefferson Street, CHICAGO, ILL.



Something New

The only Cover on the Market that will repair
ANY STOP BOX
It is adopted by Water and Gas Companies.
Ask your jobber or write
THE SNOW MFG. CO.
Patent 1905. DENVER, COLO.

Why not use "RED STAR"

CLOSET TANKS AND SEATS?

Our woodwork is perfectly finished—not expensive—durable—well made. **YOU CAN'T LOSE.**

RED STAR SANITARY CO., LTD.
DETROIT, MICHIGAN

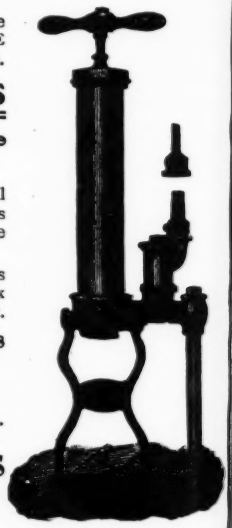
Patented

"Quinn" Syphon Action Flush Valve. None like it, works quick, and stronger than a high tank, no noise, no overflowing of tank, can't get out of order. Addres

QUINN SUPPLY COMPANY
(Patentee and sole manufacturer)
120-122 S. Western Ave., : : : : : CHICAGO

Intelligent Economy

forbids the purchase of three pumps when you can get ONE that will do the work of three.



THE PERKES

Combination Air Force and Test Pump

can be used for testing soil pipe, proving gas pipe, and is the best force pump on the market.

No stuffing boxes; all valves are on the outside, and work equally well with air or water.

Patented March 15th, 1898
Patented June 18th, 1901

Send for Complete, Descriptive Circular.

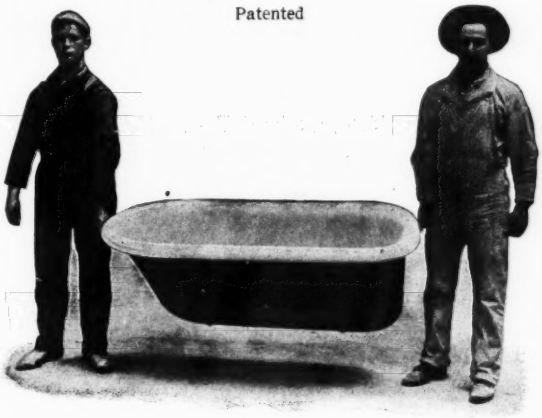
Charles Perkes
Manufacturer and dealer in Plumbing Supplies.

ESTABLISHED 1856.
627-629 Arch Street, Philadelphia.

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

FAWN Seamless Steel PORCELAINED BATHTUBS

Patented



Easily Handled

The "Fawn" Seamless Steel Tub saves the plumber his temper and many back-aches when there are several flights of stairs to climb.

Lightness combined with strength and rigidity. Take the temperature of the water almost instantly. Perfect in design and shape. Fully guaranteed. A superior article at no advance in cost. Furnished in first and competition grades.

Seamless Steel Bathtub Company. DETROIT, MICHIGAN

FOR SALE Brass Manufacturing Plant

We offer for sale the complete Brass Working Plant of The Howe Manufacturing Company, in Louisville, Kentucky

This consists of the real estate upon which the said plant is located, and boilers, engines, generators, lathes, milling machines, grinders, furnaces, and all machinery necessary to operate a plant employing 200 men, together with tools, supplies, equipment, patterns and patent rights, and also Iron Foundry, Heating Plant, Etc.

We will receive bids on this plant, as a whole, and also upon any part or parts of same, separately.

TERMS: Sales of small lots of machinery will be made for cash. The plant as a whole, or the real estate, or all or large lots of the machinery will be sold for part cash and part credit.

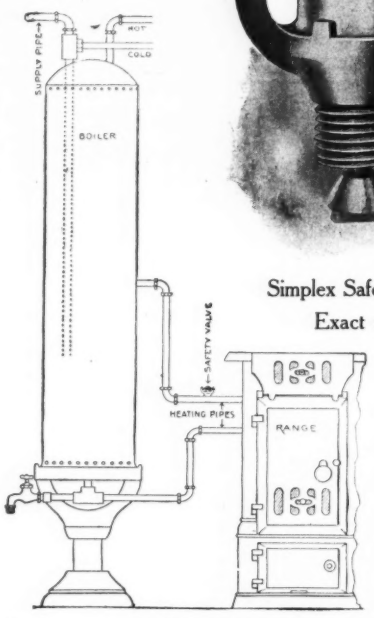
We also offer for sale, for cash, the finished product, consisting of a large assortment of cocks, valves, fittings, Crescent Heaters, injectors and ball joints, as a whole, or in lots.

Will furnish itemized lists on application. Rights reserved to reject any and all bids.

THE LOUISVILLE TRUST COMPANY, Trustee
LOUISVILLE, KENTUCKY

Striking illustration, printed in three colors, mounted on heavy board and arranged with easel back for counter display, furnished free with one dozen safety-valves.

Simplex Safety-Valve
Exact size.



Plumbers wanted everywhere to act as our agents.

Kitchen range and hot water system, showing place to attach valve.

Write us today for booklet

THE SIMPLEX MFG. CO.

140 Nassau St., : : : : : New York, N. Y.
185 Dearborn St., Chicago, Ill. 79 Milk St., Boston, Mass.

THE CHAMPION WATER FILTER

Is the only perfect and complete one!

Simple, easily cleaned and operated. Fits any faucet. Catalogue and prices of complete line upon application.

The Champion Safety Lock Co.

GENEVA, OHIO

A Plumbing Catechism

or The Theory and Practice of Plumbing Design in Question and Answer

by

CHAS. B. BALL, M. Am. Soc. C. E.

Member American Society Inspectors of Plumbing and Sanitary Engineers. Formerly Chief Sanitary Inspector Tenement House Department, New York.

AND

H. T. SHERRIFF, A. B., Editor of Domestic Engineering

Member American Society Inspectors of Plumbing and Sanitary Engineers.

This book, just published, formulates the basic principles of plumbing design and practice, crystallizing the knowledge desired by the plumber, and furnishing the non-technical reader with reliable information on the subject.

100 pp.; cloth bound, $1.00, delivered

DOMESTIC ENGINEERING

58-64 NORTH JEFFERSON STREET, CHICAGO

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

Don't be a Lemon!

Patent Pending

We have produced a perfect trap. One that has stood the severest test ever invented for an Anti-Syphon Trap

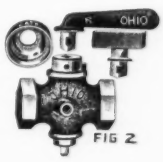
Try It!

Radcliffe's "Positive" Anti-Syphon Trap

Don't forget the name. Ask your jobber to show you one.

The Ohio Brass & Iron Mfg. Co.

CLEVELAND, OHIO



MAKERS OF THE WELL KNOWN RELIABLE OHIO STOP AND WASTE COCKS

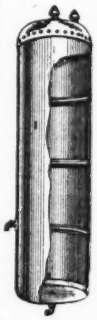
ONE very good reason and a reasonable reason is that **CLEAN SWEEP TRAPS** have the merits of being the best sanitary traps made. They are used by the Government, and are made in Brass and Lead.

Your Jobbers Have Them

DETROIT SANITARY SUPPLY CO.

Sole Manufacturers

Second Avenue, Corner Antoinette, Detroit, Michigan.



Boston Copper Range

BOILERS

ARE THE BEST MADE

We make Copper Boilers for both tank and direct pressure.

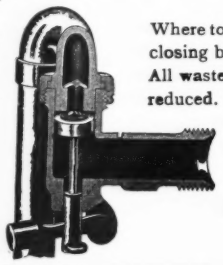
We make four grades of tank pressure boilers, thus enabling you to have any quality desired. We make pressure boilers to stand any required pressure up to 400 pounds. We guarantee all our boilers, and being the largest manufacturer of copper boilers in New England can fill orders promptly for any size.

DAHLQUIST MFG. CO.

40 W. Third St., South Boston, Mass.

Established 1899. Telephone 545 So. Boston.

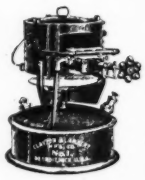
Saves Water Bills



Where towns are metered this O.K. self-closing ball-cock is a great economizer. All waste is checked and bills greatly reduced. A few words to a customer on this feature should sell this ball cock easily.

EUREKA VALVE COMPANY

19 HIGH ST., BOSTON



WHY do we keep talking about the No. 1 Fire Pot when we have so many other styles known to have special merit. We, like you, are always anxious to have our friends know and appreciate a good article, and we know that if you are using a No. 1 you are pleased and are telling your friends about it. If you are not using a No. 1 you are the loser for you are missing the extra good service you would obtain by its use. Jobbers sell at factory price. Catalog is free for the asking.

CLAYTON & LAMBERT MFG. CO.,

Detroit, Mich., U. S. A.

The Mark Found Only On Good Goods

Canfield

Many a good tank is spoiled by using a cheap rubber valve washer. Our syphon valve washers are dependable. We make them in these sizes: 1 inch, 1¼, 1⅜, 1½, 1⅝ inch and 2 inch. If you buy rubber specialties from jobbers always specify "Canfield's".

H. O. CANFIELD CO., Bridgeport, Conn.

PLUMBERS' CHAIN, EIGHT HOOKS, SPLIT LINKS, CLOSET PULLS, PIPE STRAPS, JACK CHAIN, ETC.

Write for Catalogue of

PLUMBERS' SPECIALTIES To

The Smith & Egge Mfg. Co.

BRIDGEPORT, CONN.

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

BRASS FITTINGS

Standard Weights
Tapped True

We manufacture and carry in stock all of the leading sizes

MALLEABLE BEADED PATTERN BRASS FITTINGS, MALLEABLE PLAIN PATTERN BRASS FITTINGS
Rough, Tinned, Dipped, Polished, Nickel-Plated, with iron pipe standard threads, also fine threads.

CONE JOINT BRASS UNIONS, HEAVY PATTERN MADE CORRECTLY
Round ends, Octagon ends, iron pipe threads and fine threads. Rough, Polished or Nickel-Plated.

FITTINGS FOR PLUMBERS' TUBING
Polished or Nickel-Plated, 1¼ inch and 1½ inch, 45° and 90° elbows with fine threads, also other styles usually used.

NOTE:—Our New Fitting Catalogue "F" will soon bo ready for distribution. Get your name on file for a copy. Sent free for the asking.

JENKINS MANUFACTURING COMPANY
SOLE MANUFACTURERS

FACTORY AND GENERAL OFFICES.
BLOOMFIELD, N. J.

SALES OFFICE
13-21 PARK ROW, NEW YORK CITY

THE ARKIN
A MODERN CLOSET

FOR UP-TO-DATE SANITARY PLUMBING
ALWAYS SPECIFY GOODS MANUFACTURED
BY THE FEDERAL COMPANY

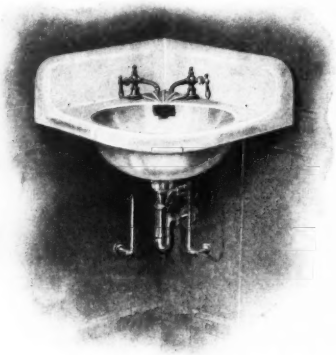
The "ARKIN" is a wall closet, attached to the wall and securely fastened to the soil pipe with heavy bolts. The "ARKIN" is a radical departure from the closets now commonly in use. Requires less water to flush. No part is attached to the floor. Occupies less space.

MANUFACTURED BY

FEDERAL COMPANY
237 Washington Street, CHICAGO, ILLINOIS

WE MANUFACTURE A COMPLETE LINE OF SANITARY PLUMBING FIXTURES

THE ARKIN
Fig. A—2030



The "ASTOR"

Kohler's Supreme

Porcelain Enameled Iron "One Piece" "Astor" Pattern Lavatory with Cast Patent Overflow. N. P. Strainer, Plug and Stopper, with Oval Basin and on Invisible Brackets.

Slab, 19 in. Back, 6 in. Basin, 11x14 in.

	Lists
All Over Enameled. Plate K 35 I . . .	$9.75
Upper Surface Only Enameled. Plate K 34 I .	7.75

J. M. KOHLER SONS CO.

SHEBOYGAN, WISCONSIN

New York, 48 Cliff St. Chicago, 19-23 N. Clark St. Oakland, 1127 5th Ave.

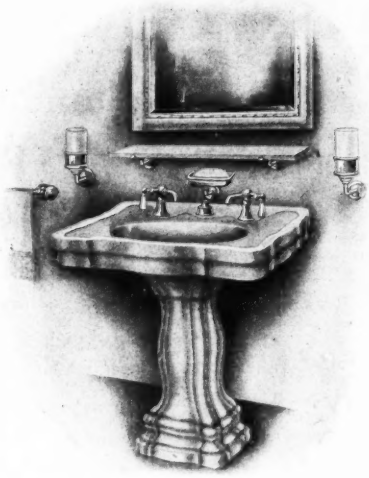


Plate 22-A

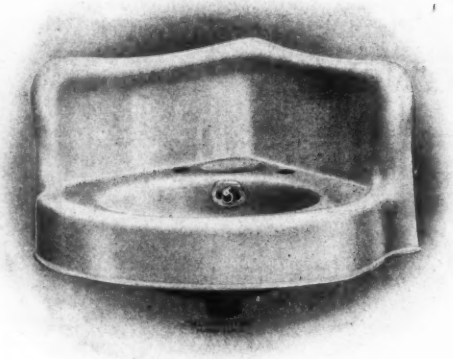
SESCO VITREOUS CHINA SQUARE LAVATORY

For Prices and styles write

THE SANITARY EARTHENWARE SPECIALTY CO.,
Trenton, N. J.

INCA—PLATE M-515
PORCELAIN ENAMELED CORNER LAVATORY

With Slab, Bowl, Apron, Overflow and Back in one piece

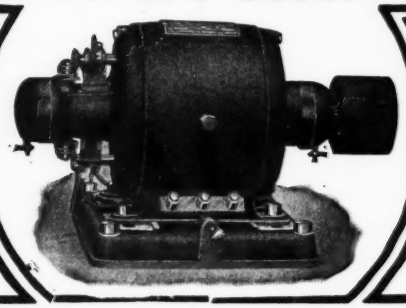


One of the many lavatories, handsome in design, perfect in finish. Made by

The Humphryes Mfg. Co., Mansfield, O.

N. Y. Office and Warehouse: 636-638 W. 34th Street.

HALF TONE AND ZINC ETCHING



OF MECHANICAL SUBJECTS A SPECIALTY WE GUARANTEE THE BEST QUALITY OF WORK BUYABLE FOR THE LEAST MONEY SEND FOR ESTIMATES ON HIGH CLASS PROCESS ENGRAVING, STEEL DIE STAMPING & EMBOSSING

CLARK ENGRAVING & PRINTING CO.
MILWAUKEE, WISCONSIN.

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

Still Another New Design

The "Tennessee" sink is now made with corner piece (either right or left corner). Back, apron corner piece and depressed drain board all cast in one piece; no cracks, no joints. Supported by concealed wall hanger and adjustable legs. Write for price and full description

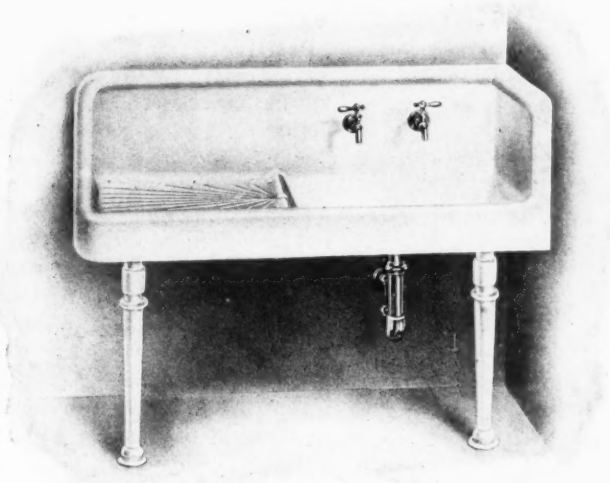


PLATE C-93 "TENNESEE" SINK

THE CAHILL IRON WORKS

CHATTANOOGA, TENN.

NEW YORK OFFICE AND SALES ROOMS, 101 BEEKMAN STREET, THOS. H. HUTCHINSON, MANAGER

Thomas Maddock's Sons Co., Trenton, N.J.

VITREOUS

LAVATORIES

23 x 27 inches

Swell front pattern, all roll rim, with D shaped bowl, made for combination fixture, fitted with white vitreous china legs.

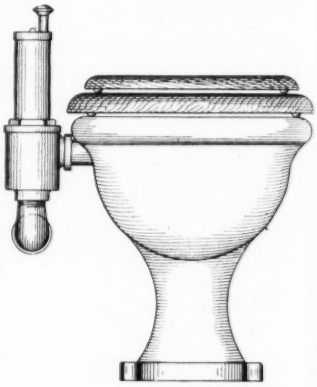
WRITE FOR CATALOGUE AND PRICES ON VITREOUS LAVATORIES.

Brooks Oil Regulator Closet Flushing Valve

NO TANK

Positively the best flush valve made

For flushing closets economically and noiselessly. When properly installed it will operate perfectly, giving a strong initial flush and a perfect refill to insure a good body of water in the bowl. It is not dependent on water for its operation and will work under any pressure. It can be placed in any desired position, attached to any closet bowl. It has no small regulation by-pass to get clogged up. Sand, Sediment, Artesian or Alkali Waters are no hindrance. Its simplicity of construction and principle of operation insures its success.



NO NOISE

Let us prove it to you.

WRITE TODAY FOR PARTICULARS

THE BROOKS MANUFACTURING COMPANY

170 South Clinton Street CHICAGO, ILLINOIS

The

KEWANEE System of Water Supply

¶ Over seven thousand Kewanee Systems in operation. Every one is a success. Nearly all were installed by plumbers.

¶ Over three million readers each month of publications in which the Kewanee System is advertised. Result,—hundreds of inquiries received every week which are referred to plumbers.

¶ Over thirty-five hundred live plumbers have received prices and discounts; and most of them are prepared for "Kewanee" business. Do YOU know about the Kewanee System?

¶ Wherever a highly satisfactory water supply system—better than elevated or attic tanks—is desired, the Kewanee System will make good. We guarantee that.

¶ Each Kewanee System is installed at our risk—not yours.

¶ It will be worth your while to write us at once for catalogs and discounts. Our reply may help you increase your business.

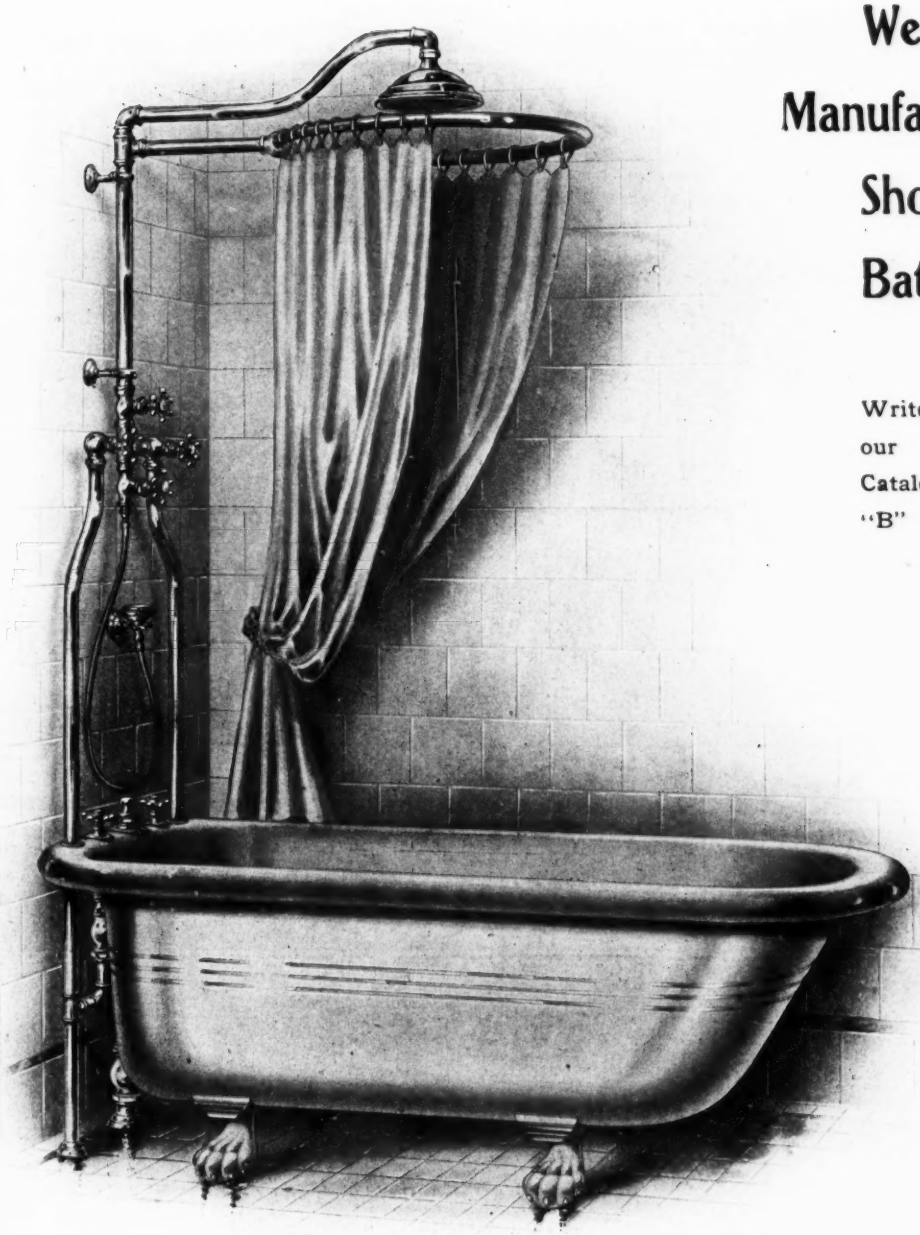
Ask for Price Book No. 45

Kewanee Water Supply Co.

DRAWER UU, KEWANEE, ILL.

Buildings illustrated, equipped with Kewanee System

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.



We Manufacture Shower Baths

Write for our Catalog "B"

SHOWER BATH B 1122

ABSOLUTELY THE FINEST SHOWER BATH MADE

Nickel Plated Shower with Shampoo Attachment with Curtain Ring and Rubber Curtain, with Low Bell Supply Bath Fixture complete. All Valve Handles and Waste Top with China Index Centers (no tub), list.....$75.00
Above Fixtures made to fit 4¾ in. Roll Rim "Monarch" Enamel Iron Bath Tub. Tub with Fixtures fitted complete can be furnished, if desired. Price on Application. Diameter of Shower Head, 6½ inches. Diameter of Curtain Ring, 24 inches.

WRITE FOR DISCOUNTS

STREET & KENT MANUFACTURING COMPANY, 43-45 Fulton St., Chicago, Ill

"Never-Leak-Tank-Lining"

F. & K.'s "Never-Leak-Tank-Lining" is the result of fifteen years of keeping a little ahead of all competitors. Just consider some of our "claims":

New Style—No. 3, Bent, Low-down Tank

Each complete "Never-Leak-Tank-Lining" is perfect. No water such as used for domestic purposes will attack it no matter how much acid, alkali or other corrosive ingredient contained. It is absolutely proof against electrolysis. It positively will not "sweat". It will last indefinitely where no metal lining stood three months. It fits the tank perfectly.

THE PRICE IS NO HIGHER THAN HEAVY LEAD OR COPPER. Ever try it? One installation will make you its friend for life.

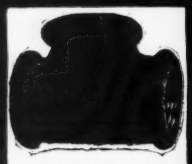
Ask your jobber for particulars or write us today for Catalogue

Findeisen & Kropf Manufacturing Company

High Grade Plumbers' Woodwork

Twenty-first Place and Rockwell Street, CHICAGO, ILL.

MALLEABLE IRON FITTINGS



Beaded ¼" to 6"

Malleable Fittings from Cast Iron Pattern ¼" to 16"

FOR

Quick Shipments

Send Your Orders To

Plain ⅛" to 2" inclusive

Malleable Drainage Fittings

THE KELLY & JONES CO.

WORKS--GREENSBURG, PA.

NEW YORK PITTSBURG ST. LOUIS DENVER

CHICAGO SAN FRANCISCO

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

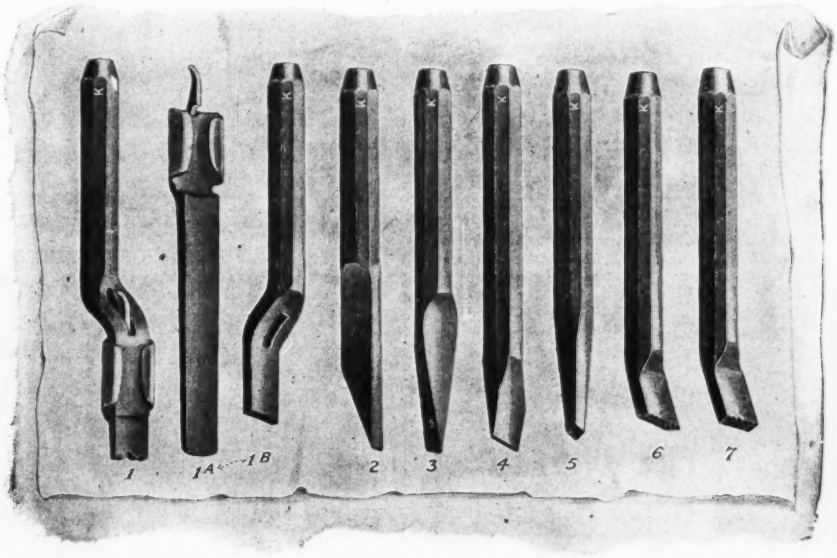
K K

Kit of "K" Korkers

We will send you a Kit of our "K" Korkers on 5 days' trial, if not satisfactory, you may return them at our *expense*. With this set we send you *Free of Charge* a good serviceable canvas bag.

"K" Quality

These tools are all made of the best quality, thoroughly hardened and tempered *Swedish tool steel*, and guaranteed to give such service as no others can. If you do not handle the tools yourself, your journeyman or apprentice would highly appreciate them and you will be repaid in the saving of time by the use of the best grade or "K" quality tools.



1 Combination (1A and 1B) gasket and packing irons.
2 Brick or joint chisel.
3 Cape chisel.
4 Cold chisel.
5 Diamond nose chisel.
6 R. H. } In and out caulking irons, the inside and outside edges
7 L. H. } are made on a curvation to correspond to curve of the soil pipe

FLECK BROS CO.

Philadelphia, *Plumbing Supplies* **Pa.**

K K

The Broughton Self-Closing Basin Cocks have been in use for many years. Some of the largest Hotels and Public Buildings in the United States are equipped with these goods. Made in Brass, Nickel or Silver Plated, and in Solid Silver-Metal.

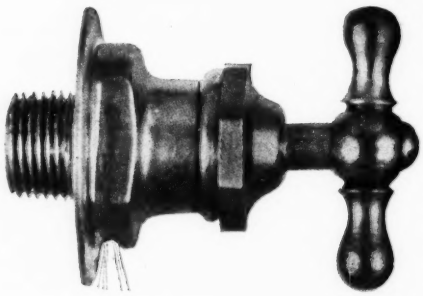
EVERY ONE WARRANTED

Manufactured Only by **E. STEBBINS MFG. CO.**

SPRINGFIELD, MASS. Works at Brightwood

Stub W. T. Bibbs

Just A Little Different



ASK ABOUT THEM

Everything in brass for the plumber and some things for the steamfitter.

EAGLE BRASS WORKS

Detroit, Michigan

LUDLOW

Gate Valves
Fire Hydrants
Sluice Gates
Cast Iron Pipe
Water Works
SUPPLIES

MANUFACTURED BY

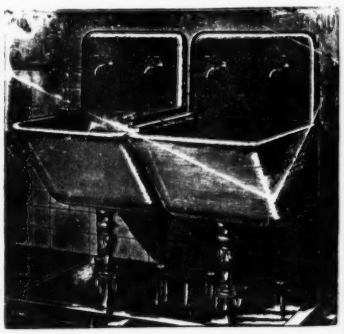
PITTSBURGH MFG. CO.

Pittsburgh, Pa.

N. Y. Sales Agent: New York Heater & Supply Co , 160 Fifth Ave.

WRITE FOR OUR CATALOGUE

Mr. High Grade Contractor
OF PLUMBING WORK



To you in particular we call attention to our solid porcelain, highly glazed Laundry Trays and Sinks. They are imperishable, save from extreme violence, beautiful in appearance, and above all, wholly sanitary. They meet with unerring approval from particular customers and therefore vitally enhance your own reputation for fine work.

Your request for our catalogue will be promptly acknowledged

Charles Graham Chemical Pottery Works

986-1018 Metropolitan Ave., Brooklyn, New York.

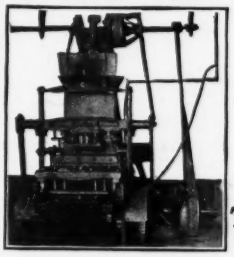
THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXX.

Indespensable to Plumbers

The Sisson Insertable Soil Pipe Joints. Ask your Jobber for our booklet or write us if he is out of them.

R. ESTABROOK'S SONS
1st and C Streets, South Boston, Mass.

The "Berkshire"



A complete mold a minute. Absolutely automatic. You push the lever and the machine does all the rest.

Write us for circular and complete description.

The Berkshire Mfg. Co.
CLEVELAND, OHIO

C. N. HOOPER, Dubuque, Ia.

VITREOUS ENAMELING

TECHNOLOGIST

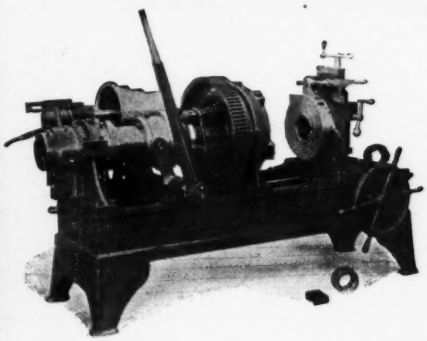
Designs, builds and starts new plants. Improves quality and reduces the costs in those already established.

THE CELEBRATED

BELL WASHER

TAKE NOTICE: All washers manufactured by Andrew Bell will be stamped "The Bell" in future. Samples sent by mail. Made only by

ANDREW BELL
375 Market Street, Newark, N. J.



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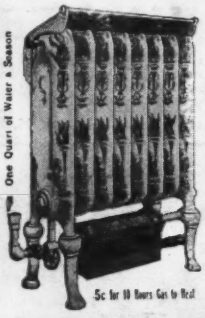

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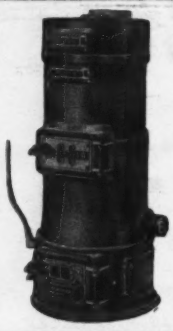

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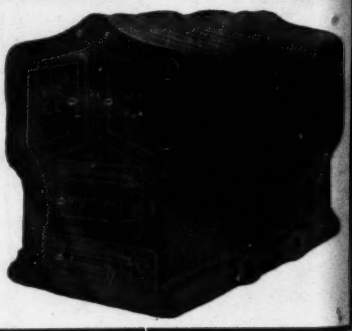

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